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The

Canadian Society of Civil Engineers

413 DORCHESTER STREET WEST, MONTREAL

Established Feb. 24, 1887; Incorporated by Dominion Act, June 23rd, 1887

(50 VIC., CAP. 124)

Report of Annual Meeting

1910

VOLUME XXIV

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Canadian Society of Civil Engineers.

REPORT OF PROCEEDINGS OF THE TWENTY-FOURTH ANNUAL MEETING, HELD IN THE CITY HALL, OTTAWA, 25TH TO 27TH JANUARY, 1910.

The President, Mr. G. A. Mountain, in the chair.

MORNING SESSION, JANUARY 25TH, 1910.

MR. G. A. MOUNTAIN.—Gentlemen, in declaring the twenty-fourth Annual Meeting of the Canadian Society of Civil Engineers open for business, I hope it is our earnest wish and aim to conduct our deliberations and our discussions on a broad and intelligent basis, with calmness and with thoroughness, so that when we depart we may all feel that we have learned something; that the decisions reached and recommendations made are authoritative, and of value in carrying out our work, so that the results may prove satisfactory to ourselves and to those whose interests we serve. The President

There will be an official welcome by the Mayor at 12 o'clock.

The first business is the reading of the minutes.

The minutes of the last annual meeting, held in Toronto, January 28th, 1909, were read by the Secretary.

DR. GALBRAITH.—Before the minutes are confirmed I should like a correction to be made. In referring to the entertainment given by the Engineering Society of the University, my name is mentioned as President. It was Mr. R. J. Marshall who presided, as President of the Engineering Society of the University of Toronto. Dr. Galbraith

The minutes were then confirmed.

MR. C. S. LEECH.—Mr. President, before the general business is proceeded with, I should like to call attention to a paragraph in the notice of this meeting, and to ask whether it has been the custom in years gone by for the Council to proceed with its functions, as specified in paragraph 33 of the By-Laws, immediately after the adjournment of the annual meeting of the Society; that is to say, to the appointment of committees, officials, and so on? Mr. Leech

That has been done at a meeting of the Council held immediately after the annual meeting. The President

Then, Mr. President, I wish to raise a very serious question. Last year's notice of the annual meeting stated that an "informal meeting" of the newly elected Council would be held immediately after the adjournment of the annual meeting. I ask you to note particularly the two words "an informal." Mr. Leech

The President I can answer Mr. Leech by saying that the word "informal" was put in there by me. I hold myself personally responsible for that.

Mr. Leech This year I notice that at 3 p.m., or immediately on adjournment of the annual meeting of the Society, a meeting of the Council is to be held. That gives no opportunity for absent members who are up for election at this annual meeting to be given proper notice that they are elected members of the Council. Unless a gentleman comes here on the speculation that he is likely to be elected a member of the Council, he cannot exercise the functions that he should under By-Law 33. If it is necessary, I will ask that this meeting support me to the extent of saying that it shall be an instruction from this meeting that the new Council shall not act under By-Law 33 until every member of the new Council has been officially notified and given the opportunity to attend a properly summoned meeting.

The President In these meetings, Mr. Leech, held immediately after the annual meeting, we get a great many men from different sections of the country, so that it is one of the largest meetings of the year.

Mr. Leech I grant you that, sir, but I say it is unconstitutional. I am not raising the point with any animus, but simply as a constitutional point. It is not right that a member who is elected should be debarred from exercising his privileges by reason of inability to attend the annual meeting.

Mr. Coutlee Mr. C. R. Coutlee.—I think the member is out of order. The first proceeding to-day is the appointment of scrutineers.

The President I think Mr. Leech is in order, but I may say to him that the proceedings are always confirmed by the Council at its next regular meeting.

Mr. Leech I have brought this up as a point of order on a paragraph of the summons by which the meeting is called. It is a wrong way to hold a meeting and transact important business without the members of Council knowing that they are elected and that a meeting is to be held. I stand on that as my solid position.

Mr. J. Kennedy Mr. John Kennedy.—Mr. President, it seems to me that Mr. Leech has taken a wrong view of the matter. The facts are that it has been announced, before the time of the annual meeting, that the Members of Council who may be elected will hold their first meeting at a specified time, at the close of the annual meeting. Previous to that time the elections have taken place and the results publicly announced. In this way every new Member of Council is notified of his election, and, therefore, knows that he is entitled and requested to attend the previously called meeting of the new Council. Some newly elected members may not be present at the annual meeting, but as a matter of fact more are present at that than at any other time, and the first meeting of Council is almost always

the largest held during the year. In that as well as in other respects it is, therefore, the appropriate one for appointing standing committees and doing the first things which the new Council has to do. It seems to me that the first meeting of Council has been regularly called and that its members have been regularly notified. I know also from long experience as a Member of Council, that the practice has worked well, and I think it should be continued.

MR. W. MCNAB.—Mr. Chairman, I think the point raised by Mr. Leech is in order, but it seems to me that it is a matter for the Council to deal with. The Council has been elected, and it is its duty to appoint the committees. The rank and file of the membership have nothing to do with this matter; it is a thing that the members of Council may take exception to, but it is not for this meeting. Mr. McNab

If Mr. Leech wishes to bring the matter up for resolution, he may do so when we come to the consideration of general business. The President

APPOINTMENT OF SCRUTINEERS.

With your approval, I beg to name as scrutineers for ballots the following:

Officers and Members of Council:
O. P. Schreiber, Chairman.
C. V. Johnson.
H. J. Heygate.
H. H. Pinch.

Nominating Committee:
H. V. Brayley, Chairman.
W. M. Everall.
J. R. Grant.
F. M. Davis.

Amendments to By-Laws:
F. A. Drought, Chairman.
H. W. Jones.
F. J. Delaute.
A. R. Ketterson.

Carried.

Perhaps some one will move that the report of Council be taken as read, and it will then be open for discussion. The President

Moved by Mr. MacPherson, seconded by Dr. Bell Dawson, that the report of Council be received for discussion. Carried.

Report of Council for the Year 1909

The Council presents the following report on the work of the Society during the past year:

Roll of the Society.

The elections took place as follows: Twenty-five Members, eighty-three Associate Members, six Associates, and one hundred and seventy-seven Students—in all, three hundred and ninety-one. One Member, Mr. Collingwood Schreiber, was elected an Honorary Member, twenty-four Associate Members were transferred to the class of Member, five Students were transferred to the class of Member, ninety Students were transferred to the class of Associate Member, two Associates were transferred to the class of Associate Member, and one Student was transferred to the class of Associate. There have been fifteen deaths—seven Members, five Associate Members, one Associate, and two Students. Amongst the deaths the Council notes with deep regret that of Mr. W. McLea Walbank, Past President and Honorary Member of Council. There have been removed from the rolls by resignation and on account of non-payment of dues thirteen Members, fourteen Associate Members, one Associate, and ten Students.

At present the membership stands as follows:

	Res.	Non-Res.	Total.
Hon. Members	3	11	14
Members	94	427	521
Associate Members	133	691	824
Associates	17	28	45
Students	289	876	1,165
Total			2,569

In addition to the foregoing, there are before the Council 52 applications for Corporate Membership and 5 applications for admission as Students. These, if added to the above, would make a total membership of 2,626.

At the same time last year the total membership was as follows:

	Res.	Non-Res.	Total.
Honorary Members	3	10	13
Members	90	398	488
Associate Members	123	569	692
Associates	15	27	42
Students	310	786	1,096
Total			2,331

Annual Meeting.

The twenty-third Annual Meeting was held in the King Edward Hotel, Toronto, from the 28th to the 30th January, 1909, Dr. J. Galbraith, President, in the chair. The meeting was called to order on Thursday, 28th January, at 10.30 a.m. The President named the scrutineers for the various ballots. The minutes of the last Annual Meeting and the Reports of the Council, the Treasurer, and the Library and House Committee were read, and, after discussion, adopted. Reports of the various branches and committees were also read and discussed. Luncheon was served in the banquet hall of the hotel, and the meeting reassembled at 3.00 p.m. A reception was held at Government House at 5.00 p.m. In the evening the retiring President read his address in the Convocation Hall of the University of Toronto, after which the members were entertained at a banquet given by the Engineering Society of Toronto University. On Friday, 29th January, the members visited the works of the Canadian Westinghouse Co.; the International Harvester Co; and the Hamilton Bridge Company's Works, at Hamilton; the Canadian Portland Cement Co., and the grain elevator recently erected by the Dominion Government at Port Colborne. The party was entertained at luncheon by Mr. J. A. Jamieson at Port Colborne. In the evening the annual dinner was held in the King Edward Hotel, and was attended by one hundred and twenty members and guests. On January 30th the reports of the scrutineers were received and the business of the meeting concluded.

Meetings.

The Council has held ten meetings during the year. There have been twenty-three meetings of the Society—four business meetings, eighteen sectional meetings, and one students' meeting.

The following papers were presented:

General Section:

"Some Notes on a Method of Obtaining Time and Latitude," by G. Blanchard Dodge, A. M. Can. Soc. C. E.

"On the Variation of the Coefficient of Discharge for Small Orifices," by T. P. Strickland, Stud. Can. Soc. C. E.

"Reinforced Concrete Construction," by S. G. Smith, Stud. Can. Soc. C. E.

"Modern Fireproof Construction: Facts and Figures," by W. N. Moorhouse, Stud. Can. Soc. C. E.

"Phototopography, with special reference to the Alaskan Boundary," by P. W. Greene, Stud. Can.Soc. C. E.

"Foundations for Addition to Manhattan Life Building, New York City," by T. Kennard Thomson, M. Can. Soc. C. E.

"Reclamation and Development on the New Jersey Coast," by G. L. Watson, A. M. Can. Soc. C. E.

"Railway Construction Notes," by F. Pardoe Wilson," A. M. Can. Soc. C. E.

"The Construction of a Concrete Mass and Blockwork Quay Wall by Helmet Divers in Open Water," by John Taylor, A. M. Can. Soc. C. E.

"Some Experiments on the Resistance of Pavements," by A. C. D. Blanchard, A. M. Can. Soc. C .E.

"Impact Stresses," by E. A. Stone, M. Can. Soc. C. E.

"Construction of Lethbridge Viaduct, Crow's Nest Branch, Canadian Pacific Railway," by C. N. Monsarrat, M. Can. Soc. C. E.

"Description of the New Harbour, Wet Dock, and Graving Dock at Avonmouth, England," by A. Don Swan, M. Can. Soc. C. E.

"The Aesthetics of Design," by P. E. Nobbs, M.A.

Electrical Section:

"The Oscillograph," by J. A. Johnson.

"The Tungsten Lamp and its Behaviour on Life Tests as compared with Carbon Lamps," by H. D. Burnett.

"The Use of Aluminum as a Conductor," by J. C. Smith, A. M. Can. Soc. C. E.

"Determination of Train Resistance," by E. I. Wenger.

"A 2,750-Volt Direct Current System," by A. H. Barringer.

Mechanical Section:

"Some Features in the Design and Construction of the Manhattan Suspension Bridge," by John C. Ostrup, Professor of Structural Engineering, Stevens' Institute, Hoboken, N.J.

"The Use of Alcohol in an Internal Combustion Engine," by G. L. Guillet, M.Sc.

Mining Section:

"Monel Metal," by A. Stansfield, A. Can. Soc. C. E.

"Reports on Tests of Monel Metal," by E. Brown, A. M. Can. Soc. C. E.

Students' Meeting:

"Skew Connections in Complicated Steel Structures," by Alex. Peden, junr., A. M. Can. Soc. C. E.

Branch Societies.

The Chairmen and Secretaries of the Branch Societies during the year were as follows:

Manitoba Branch, Winnipeg:

Chairman—H. N. Ruttan.
Secretary—E. E. Brydone-Jack.

Toronto Branch:

Chairman—J. G. G. Kerry.
Secretary—E. A. James.

Ottawa Branch:

Chairman—C. R. Coutlee.
Secretary—S. J. Chapleau.

Quebec Branch:

Chairman—L. A. Vallee.
Secretary—H. O'Donnell.

Vancouver Branch:

Chairman—G. H. Webster.
Secretary—H. K. Dutcher.

Reports on the work of the Branches will be presented during the meeting.

Committees.

The following have been the Committees of Council during the year:

Library and House Committee:

R. S. Lea, Chairman.
F. P. Shearwood.
L. A. Herdt.
E. Marceau.
W. Kennedy, junr.

Finance Committee:

W. F. Tye, Chairman.
F. L. Wanklyn.
H. Holgate.
E. Marceau.
W. McLea Walbank.

The Gzowski Medal Committee:

L. A. Herdt, Chairman.
J. M. Shanly.
F. P. Shearwood.
W. Kennedy, junr.
J. B. Porter.

The following Committees were appointed by the Annual Meeting:

Committee on Usefulness of the Society and Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
J. G. G. Kerry.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Committee on Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.

Transportation Committee:

G. A. Mountain, Chairman.
D. MacPherson.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
J. Kennedy.

SUB-COMMITTEES ON TRANSPORTATION.

Ties:

D. MacPherson, Chairman.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
M. J. Haney.
Wm. McNab.
H. G. Kelley.
J. G. Sullivan.
T. C. Burpee.
H. A. Woods.
M. H. MacLeod.
A. F. Stewart.
W. B. Mackenzie.
W. A. Bowden.

Transportation Routes:

W. F. Tye, Chairman.
C. R. Coutlee.
F. W. Cowie.
J. A. Jamieson.

H. O. Keay.
G. H. Frost.
Wm. McNab.
E. D. Lafleur.
W. D. Barclay.
M. H. MacLeod.
C. H. Keefer.
A. St. Laurent.

Roadbed and Ballasting:

J. G. Sullivan, Chairman.
D. MacPherson.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
M. J. Haney.
W. McNab.
H. G. Kelley.
T. C. Burpee.
W. B. Mackenzie.
B. B. Kelliher.
H. A. Woods.
M. H. MacLeod.
A. F. Stewart.
L. A. Vallee.
R. McColl.

Rail Fastenings and Tie-Plates:

Howard G. Kelley, Chairman.
D. MacPherson.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
J. G. Sullivan.
T. C. Burpee.
A. Stansfield.
B. B. Kelliher.
A. F. Stewart.
L. A. Vallee.
H. A. Woods.
R. McColl.

Committee on the Establishment of Testing Laboratories:

C. H. Keefer, Chairman.
J. Galbraith.
H. M. Mackay.
J. A. Jamieson.
W. McLea Walbank.

The following were appointed in charge of the work of Sections from June, 1909, to June, 1910:

Electrical:

L. A. Herdt, Chairman.
C. H. Mitchell, Vice-Chairman.

Mechanical:

W. Kennedy, junr., Chairman.
H. A. Bayfield, Vice-Chairman.

Mining:

C. Fergie, Chairman.
R. W. Leonard, Vice-Chairman.

General:

F. P. Shearwood, Chairman.
A. St. Laurent, R. S. Lea } Vice-Chairmen.

OFFICERS.

The Council appointed Mr. E. Marceau, Treasurer, and Mr. C. H. McLeod, Secretary, for the year 1909.

AWARD OF GZOWSKI MEDAL.

The Committee has made a unanimous report, recommending that the medal be awarded to Ernest Brown, Associate Member, for his paper on "Tests of Reinforced Concrete Beams."

PRIZES FOR STUDENTS' PAPERS

Electrical Section (R. A. Ross, M. Can. Soc. C. E., Examiner): Prize awarded to E. S. Heurtley for paper entitled "Discussion on one of the Problems of Submarine Cable Telegraphy."

General Section (F. P. Shearwood, M. Can. Soc.C. E., Examiner): Prize awarded to A. S. Trench for paper "Some Considerations on the Theories Governing the Elastic Breakdown of Members subjected to a Compound System of Stresses."

No prizes were awarded in the Mechanical or Mining Sections.

The following is a statement of elections which have taken place since the issue of Bulletin No. 5:

12th June, 1909.

Members:

Blaiklock, M S. Gibbs, F. N.
Swan, A. Don.

Associate Members:

Benzie, D. Lea, W. S.
Chisholm, F. A. MacKenzie, H. A.
Cote, J. L. Roby, M. A.
Drowley, A. Sharpe, A. E.
Fotheringham, J. M. Shields, J. D.
Gwyer, W. K. Stacey, H. F.

Transferred from Associate Member to Member:

Dawson, A. S. McCulloch, A. L.
Jaquays, H. M. Skaife, Lewis.
Taylor, W. V.

Transferred from Student to Member:

Killaly, H. M. Wise, F. A.

Transferred from Student to Associate Member:

Bidwell, L. M.
Blumenthal, S.
Carter, D. J.
Dey, V. A. G.
Johnston, E. P.
Millidge, E. R.

Students:

Boese, G. P. F.
Campbell, A. S.
Daniell, O. C.
Fischer, O. F.
Hawkins, S. H.
James, E. W. M.
Jost L. G.
Lawledge, F. M.
Loucks, R. W. E.
Leatherdale, M. J.
Melhuish, P.
Milot, J. A.
McDougal, John E.
MacAfee, R. E.
Martidale, E. S.
Polyblank, K. G.
Read, H. E.
Sullivan, A. W.

9th October, 1909.

Honorary Member:

Schreiber, Collingwood.

Members:

Anderson, F.
Caughey, C. M.
Conway, C. R. G.
Fay, F. H.
Fox, C. B.
Harvey, J. B.
Volckman G. W.

Associate Members:

Alexander, H. A.
Bourbonnais, A. O.
Brian, M. E.
Charles, H. H.
Gahan, H. N.
Harper, W. B.
Hollingworth, W.
Jermyn, P. V.
Kahn, G.
Lamoureux, J. A.
Latornell, A. J.
Mellor, A. A.
McArthur, F.
Near, W. P.
Riddall, J. B.
Robinson, L. H.
Ryan, H. A.
Silverton, F.
Taylor, A.
Wass, S. B.
White, T. W.
Wimbles, A.

Associate:

Casgrain, C. P.

Transferred from Associate Member to Member:

Barton, D. S.
Chapleau, S. J.
Gzowski, C. S., junr.
Macdougall, G. D.
Moritz, C. J. H.
St. Laurent, A.
Waterous, C. A.

Transferred from Student to Associate Member:

Brown, F. B.
Burnett, A.
Clarke, F. F.
Clark, G. T.
Congdon, J. H.
Davidson, W. A.
Denis, V
Devenish, W. R.
Dick, Jas.
Edwards, W. Milton
Elliot, L. B.
Foreman, A. E.
Girouard, E. C.
Girouard, R. A.
Greig, A. R.
Grenon, J. F.
Heaman, J. A.
Keith, F. S.
Landy, A. P.
Lawrence, W. D.
Lepage, J. S. S.
Livingston, D. A.
Livingston, D. C.
MacGowan, A. R.
McCuaig, G. E.
Melancon, H.
Menard, J. P.
Millar, J. L.
Moore, H. H.
Munn, D. W.
Newlands, J. E.
Richards, C. C.
Ridley, E. N .
Rogers, C. H.
Smith, S. G.
Steeves, C. McN.
Taylor, R. F.
Thorne, S. M.
Whitley, H. A.
Wilson, J. L.
Young, W. B.

Students:

Boese, P. R.
Boright, G. K.
Byrne, J. H.
Campbell, T. D.
Chenard, J. R. F.
Coulas, L. L.
Culshaw, J. G.
Dinsmore, F. L.
Dyer, A. F.
Ellis, D. S.
Foster, A. H.
Hawkins, L. K.
Innes, R. D.
Janin, A.
Jarman, P. E.
Kennedy, W. V.
Kennedy, F. W. S.
Lee, J. S.
Martin, L. A.
Neville, H. G. H.
Rogers, J. A.
Stewart, R. B.
Taylor, W.
Tebbutt, O. N.
Young, A. A.
Zverina, J.

November 13th, 1909.

Member:

Murray, T. Aird

Associate Members:

Chataway, C. C.
Goodspeed, F. G.
Strauss, J. B.
Webster, W. G.
Williams, G. C.

Transferred from Associate Member to Member:

Grundy, G. G.
Herdt, L. A.
Janin, G. A.
Wilgar, W. P.
Wilkin, F. A.

Transferred from Student to Associate Member:

Blanchet, W. H.
Blair, W. J.
Brown, W. G. B.
Collier, E. V.
Deroche, A. P.
Donaldson, J. M.
Ewart, G. R., junr.
Ferguson, G. H.
Harvey, J. B.
Hurtubise, L. L.
Malcolm, W. L.
McMaster, A. W.
Tapley, A. G.

Students:

Adrian, R. W.
Berry, E. W.
Daubney, J. E.
Dobson, A. A.
Gauvreau, P. E.
Godard, G. G.
Graham, D. A.
Grant, J. R.
Grieve, John.
Harvey, D. W.
Hooper, R.
Howe, E.
Jackson, D. A.
Jamieson, E. A.
Jones, W. H.
Killain, G.
Leger, O. E.
Little, H. R.
MacDiarmid, A. A.
MacGregor, A. E.
MacLeod, D. D.
MacMahon, J. W.
Marr, Norman.
Milne, F. V.
Motyer, A. J.
Norris, J. H.
O'Brien, J. L.
Oliver, S. E.
Openshaw, J. E.
Reid, A. C.
Ross, O. W.
Rust, F. C.
Saltzman, H.
Sandover-Sly, R. J.
Shanks, C. L.
Smith, L. Conran.
Smith, W. Roy.
Steele, S. C.
Webb, E. M.

January 8th, 1910.

Members:

Bell, P. W. W.
Burwell, H. M.
MacKenzie, J. H.

Associate Members:

Carson, W. H.
Coward, G. W.
Fultz, G. W.
Gibb, R. J.
Gilbert, W. S.
Hearne, A. R. J.
Innes, A. S.
Levesque, J. N.
Loudon, T. R.
Mack, W. W.
MacKenzie, J. A.
Nichols, J. R.
Redmond, A. V.
Roberts, T. L.
Robertson, W. D. H. C.
Smith, Sherman.
Stevenson, W. F.
Sunstrum, Alex.
Sutherland, W. H.
Swabey, H. W. B.
Walker, William

Transferred from Associate Member to Member:

Forneret, V. F. W.
Harris, J. W.

Transferred from Student to Member:

Corless, C. V.
Strickland, T. P.

Transferred from Student to Associate Member:

Agnew, A. W.
Beaudet, J. N. R.
Bodwell, H. L.
Edgar, J. H.
Greey, J. W. G.
Hamilton, G. M.
Harvie, E. N.
Jones, H. W.
Keefer, E. C.
O'Leary, H. G.
Trimingham, C. L.
Waterous, L. M.
Wilson, N. D.
Wilkes, F. C. D.

Transferred from Student to Associate:

Shehyn, A. R.

Students:

Bacon, T. H.
Batho, Cyril.
Beach, F. K.
Bothwell, C. C.
Brickenden, F. M.
Cole, H. F.
Curzon, J. H.
Davidson, R. B.

Desy, J. E.
Duggan, H. S.
Ferguson, J. B.
Ferguson, L. L.
Fitzpatrick, J. J.
Goedike, F. B.
Helliwell, J. G.
Hitt, L. W.
Hobbs, W. E.
Jefferson, F. H.
Knight, F. C.
Lacroix, P. A.
MacKay, E. G.
MacLennan, G. G.
Martin, W. H.
McDonald, P. E.
Middleton, J. R.
Prydz, P. F.
Rosenorn, P. E.
Sherriff, T. Douglas.
Smallwood, R. L.
Smith, B. O.
Smith, W. H.
Warrington, G. A.

GENERAL.

Two volumes of Transactions have been published during the year. The second volume for 1908 was distributed in May, and the first volume for 1909 will be issued about February 1st. The latter volume was ready for press, when it was destroyed by a fire which took place in the *Witness* printing office on the 23rd Sept. Owing to the very large amount of editorial work entailed by this loss, it has been found impossible to issue a Bulletin since No. 5, which was distributed in the early summer. It is proposed to publish the second volume for 1909 as promptly as possible, in order to put the discussion of the various papers which have been read during the year in the hands of the members at an early date.

Branches of the Society have been organized during the year in Ottawa and Vancouver. The five branches now in active operation comprise a membership of about three hundred and fifty.

The Council has called the attention of the Prime Minister for the Province of Quebec to the importance of appointing a qualified engineer as a member of the proposed Public Utilities Commission for the Province, and it has also suggested to the Citizens' Committee of Montreal the desirability of naming an engineer as one of the candidates for the new Board of Control. It notes with approval the nomination of a Member of the Society as one of the Committee's candidates.

The Council, having in view the partial failure of adoption of the By-Laws submitted to vote last year, has re-issued them for ballot, together with some minor amendments which have been suggested as a result of its experience during the year.

The Council desires to put on record its appreciation of the long and efficient services of Mr. H. Irwin as Treasurer of the Society. Mr. Irwin having, on account of illness, declined re-election as Treasurer, Mr. E. Marceau, Past President, was, as already reported, appointed to succeed him.

The reports of the various Committees of the Society, which were before the last Annual Meeting in progress form, and which have received the consideration of the Council, are submitted, along with the supplementary reports of the Committees concerned, for the consideration and action of the Annual Meeting.

The Annual Meeting is this year held in Ottawa, on the invitation of the branch of that city and in accordance with the wishes of the President of the Society.

G. A. MOUNTAIN,
President.

C. H. McLEOD,
Secretary.

Montreal, January 15th, 1910.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

During the year 1909 the following books have been presented or purchased. The sum of $22.00 has also been presented for the purchase of books:

By Purchase

"Reservoirs for Irrigation, Water Power, and Domestic Water Supply," with an account of various types of dams and the methods, plans, and cost of their construction. By James Dix Schuyler. New York and London, 1908. pp. 573. 381 illustrations. 6 plates. Cl. Q.

"Lathe Design for High and Low Speed Steels." By J. T. Nicholson and Dempster Smith. London, 1908. pp. 402. Ill. Cl. Q.

"Typhoid Fever: Its Causation, Transmission, and Prevention." By George C. Whipple. New York and London, 1908. pp. 407. Ill. Cl. O.

"The Government of European Cities." By W. B. Munro. pp. 402. Cl. O. New York, 1909.

"Chapters on Municipal Administration and Accounting." By F. A. Cleveland. pp. 361. O. linen. New York, London, Bombay, Calcutta, 1909.

"Local Government in Counties, Towns, and Villages." By J. A. Fairlie. pp. 272. D. Cl. New York, 1906.

Missing copies of the *Engineering Record*, from 1892-1897. This journal is now complete from Vol. 25, 1891, to date.

"Nelson's Loose Leaf Encyclopedia." In twelve volumes. Royal O., half leather. Ill. London, Edinburgh, and Toronto, 1909.

The following members have made presentations to the Library during the year:

Bronson, F. E., Stud. Can. Soc. C. E.
Cameron, J. R., Stud. Can. Soc. C. E.
Deubelbeiss, H. S., A. M. Can. Soc. C. E.
Fay, F. H., M. Can. Soc. C. E.
Gaul, A. J., A. M. Can. Soc. C. E.
Hill, H. O., Stud. Can. Soc. C. E.
James, W. A., M. Can. Soc. C. E.
MacTaggart, N. B., M. Can. Soc. C. E.
Myers, A. J., A. M. Can. Soc. C. E.
Norton, C. D., Stud. Can. Soc. C. E.
Orrock, J. W., M. Can. Soc. C. E.
Tooker, N. L., A. M. Can. Soc. C. E.
Whitney, A. W., A. M. Can. Soc. C. E.

PRESENTATIONS

"Secondary Stresses in Bridge Trusses." By C. R. GRIMM. New York, 1908. pp. 140. Cl. O.
Presented by H. S. DEUBELBEISS, A. M. Can. Soc. C. E.

"Some Electro-Chemical Centres." A report to the Electors of the Gartside Scholarships. By J. N. PRING. Manchester, 1908. pp. 136. Cl. O.
Presented by THE GARTSIDE COMMITTEE, UNIVERSITY OF MANCHESTER.

"The Design of Highway Bridges and the Calculation of Stresses in Bridge Trusses." By M. S. KETCHUM. New York and London, 1908. pp. 544. Tables, 77. Ill. Cl. O.
Presented by THE ENGINEERING NEWS PUB. CO., New York.

"The Electric Furnace—its Evolution, Theory, and Practice." By A. STANSFIELD. Toronto, 1907. pp. 194. Ill. Cl. O.
Presented by THE CANADIAN ENGINEER, Toronto.

"The Canadian Pacific Railway"—Report of Progress on the Explorations and Surveys up to January, 1874. By SANDFORD FLEMING. Ottawa, 1874. pp. 285. Pl.9. Bds. O.
Presented by A. J. GAUL, A. M. Can. Soc. C. E.

"Producer Gas." By J. EMERSON DOWSON and A. T. LARTER. London and New York, 1907. 2nd ed. pp. 304. Cl. O.
Presented by H. O. HILL, Stud. Can. Soc. C. E. (Duplicate.)

"Railroad Structures and Estimates." By J. W. ORROCK. 1st ed. pp. 270. Ill. Cl. O. New York and London, 1909.
Presented by THE AUTHOR.
Duplicate copy also *presented by* THE RENOUF PUB. CO., Montreal.

"Aerodonetics: constituting the Second Volume of a complete work on Aerial Flight." By W. F. LANCASTER. New York. pp. 433. Ill. Cl. O.
Presented by F. E. BRONSON, Stud. Can. Soc. C. E.

"Hydraulics." Vol. 1., Hydraulic Machinery. By S. DUNKERLEY. pp. 343. Ill. O. Cl. London and New York, 1907.
Presented by J. R. CAMERON, Stud. Can. Soc. C. E.

"Second Annual Report of the Railroad Commission of Wisconsin." pp. 1229. O. linen. Madison, Wis., 1908.
Presented by THE COMMISSION.

"Modern Methods of Street Cleaning." By GEO. A. SOPER. pp. 182. Ill. O. linen. New York and London, 1909.
Presented by THE ENGINEERING NEWS PUB. CO.

"Waterproofing." By MYRON H. LEWIS. Reprinted from *Transactions* Municipal Engineers of New York, 1908. Paper cover.
Presented by THE ENGINEERING NEWS PUB. CO.

"Report Advisory Board of State of New York Consulting Engineers, 1908," upon its work relating to the Barge Canal, from January, 1908, to January, 1909. pp. 303. Ill. linen. O. Albany, 1909.
Presented by THE BOARD.

"The Population and Finances of Boston"—a Study of Municipal Growth. By F. H. FAY. pp. 33. Ill. linen. sq. F. Boston, 1901.
Presented by F. H. FAY, M. Can. Soc. C. E.

"Methods and Devices for Bacterial Treatment of Sewage." By W. M. VENABLE. pp. 236. Ill. linen. O. 1st ed. New York and London, 1908.
Presented by C. D. NORTON, Stud. Can. Soc. C. E.

"Problems of City Government." By L. S. ROWE. pp. 349. Cl. O. New York, 1908.
Presented by W. A. JAMES, M. Can. Soc. C. E.

"National Association of Railway Commissioners"—Proceedings of Annual Conventions (16th, 17th, 18th, 19th, and 20th). 5 vols. Boards. O. Washington.
Presented by THE COMMISSION.

"Reports of the Auditor-General," 1896-1900, 1902-3-4-5-6 (18 vols. in all.) Paper covered. Ottawa.
Presented by THE AUDITOR-GENERAL.

"Reports Interstate Commerce Commission," 1905-06-07-08 (four vols). Boards. O. Also "Statistics of Railways in the United States," 1906-07. Cl. O. Ill.
Presented by THE COMMISSION.

"Report of the Board of Engineers on Deep Waterways between the Great Lakes and the Atlantic Tide Waters." In two parts, with atlas. Ill. Paper cover. Washington, 1900.
Presented by THE BOARD.

"Transactions Master Car Builders." (Incomplete Set.) 1882-1890. 1895-1898. 1905-1907. 1908.
Presented by THE MASTER CAR BUILDERS' ASSOCIATION.

The following is a complete list of periodicals, magazines, transactions, etc., regularly received and on file in the Library:

†A.B.C. Guide, *Montreal.*
American Machinist, *New York.*
*American Society of Civil Engineers, Transactions and Proceedings, *New York.*
*American Society of Mechanical Engineers, Transactions, *New York.*
*American Society for Testing Materials, *Philadelphia.*
American Institute of Architects, Quarterly Bulletin, *Washington.*
*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*
American Society of Engineering Contractors' Journal, *New York.*
*American Institute of Mining Engineers, Transactions, *Philadelphia.*
American Architect, *New York.*
American Engineer and R. R. Journal, *New York.*
American Railway Engineering and Maintenance of Way Association, *Chicago.*
American Water Works Association.—Proceedings.
Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico.*

"Antonio Alzate" Scientific Society, Transactions, *Mexico.*
Association of Architects of Province of Quebec, Year Book, *Montreal.*
Association of Architects of Ontario, Annual Report, *Toronto.*
Association of Engineering Societies, Journal of, *New York.*
Association of Ontario Land Surveyors, Annual Report, *Toronto.*
Barge Cannel, Bulletin, *New York.*
Bibliographie des Sciences et de l'Industrie, *Paris.*
Board of Water Supply of the City of New York, *New York.*
Boston Public Library, Bulletin and Annual Report, *Boston.*
Boston Society of Civil Engineers, *Boston.*
Brooklyn Engineers' Club, Proceedings, *Brooklyn.*
Builders' Bulletin, *Montreal.*
Bureau of Standards, Bulletin, *Washington.*
Bureau of Mines, Report, *Toronto.*
Canadian Cement and Concrete Review, *Toronto*
Canadian Engineer, *Toronto.*
Canadian Electrical Association, *Toronto.*
Canadian Electrical News and Engineering Journal, *Toronto.*
Canadian Forestry Association, *Ottawa.*
*Canadian Institute, Transactions, *Toronto.*
Canadian Machinery and Manufacturing News, *Toronto.*
†Canadian Magazine, *Toronto.*
Canadian Manufacturer, *Toronto.*
Canadian Mining Institute, Transactions, *Montreal.*
Canadian Mining Journal, *Montreal* and *Toronto.*
Canadian Municipal Journal, *Montreal.*
Canadian Patent Office Record, *Ottawa.*
Carnegie Library of Pittsburg, *Pittsburg.*
Cassier's Magazine, *New York.*
Cement Record, *Kansas City, Mo.*
"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*
†Century, The, *New York.*
†Chambers' Journal, *London, Eng.*
Cleveland Engineering Society Journal and Transactions, *Cleveland.*
*Cleveland Institute of Engineers, Transactions, *Middlesborough.*
Colorado School of Mines, Bulletin, *Golden, Col.*
Concrete Review, *Philadelphia.*
Construction, *Toronto.*
Contract Record, *Toronto.*
Cornell Civil Engineer, *Ithaca, N.Y.*
Crerar Library Reports, *Chicago.*

Department of Marine and Fisheries, *Ottawa.*
Department of Mines, *Ottawa.*
Department of Public Works, *Ottawa.*
Department of Railways and Canals, *Ottawa.*
Department of the Interior, *Ottawa.*
Electrical Engineer, *London, Eng.*
Electric Journal, *Pittsburg.*
Electric Railway Journal, *New York.*
Electrical Review and Western Electrician, *Chicago.*
Electrical Review, *London, Eng.*
Electrical World and Engineer and American Electrician, *New York.*
*Engineers' Club of Philadelphia, Proceedings, *Philadelphia.*
Engineers' Club, *Toronto.*
*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineering Association of the South, Proceedings, *Nashville, Tenn.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*
Engineering-Contracting, *New York.*
Engineering Digest, *New York.*
Engineering News, *New York.*
Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Journal of Canada, *Toronto.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*
Engineering Standards Committee Reports, *London, Eng.*
Engineering Times, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Canada, Reports of, *Ottawa.*
Geological Survey of Ohio, *Columbus, Ohio.*
Geological Survey of Oklahoma, *Oklahoma.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieurs,' *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Magazine, *Cleveland.*
Industrial Progress, *Milwaukee.*

Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*
*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Waterways Commission, *Ottawa.*
†Iron Age, *New York.*
Iron Trade Review, *Cleveland.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumière Electrique, *Paris.*
*Liverpool Engineering Society, Transactions, *Liverpool.*
†London Magazine, *London.*
A Magyar Merök-es Epitesz-Egylet, *Budapest.*
Machinery, *New York.*
Marine Review, *Cleveland, Ohio.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*
Mines and Minerals, *Scranton.*
*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Motor Car Journal, *London, Eng.*
Municipal Engineering, *Indianapolis.*
New Orleans Sewerage and Water Board, Report, *New Orleans.*
North of England Institute of Mining and Mechanical Engineers. *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
†Power and the Engineer, *New York.*
Providence, City of, Annual Report, *Providence.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*

Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railroad Age Gazette, *Chicago.*
Railway and Marine World, *Toronto.*
Report of Chief Engineer, U. S. Army, *Washington.*
Revista Technologico Industrial, *Barcelona.*
Royal Architectural Institute of Canada, Proceedings and Quarterly Bulletin, *Montreal.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng.*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*
Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*
Royal Institute of Engineers, Transactions, *The Hague.*
Royal Irish Academy, Transactions, *Dublin.*
School of Mines, Quarterly, Columbia College, *New York.*
†Scribner's, *New York.*
†Sketch, *London, Eng.*
Smithsonian Institution, Reports, *Washington.*
Société Scientifique Industrielle de Marseille, *Marseilles.*
Société Industrielle de l'Est, *Nancy, France.*
Société Industrielle du Nord de la France, *Lille, France.*
Société des Ingenieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
Technical Index, *London, Eng.*
Technology Review, *Boston.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*

Valve World.
Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*
Zeitschrift für Architecten u. Ingenieurwesen, *Hannover.*
Zeitschrift des Osterreichischen Ingenieur u. Architekten Vereines, *Vienna.*

University Publications:

Armour Institute of Technology, Year Book and Bulletin, *Chicago.*
Cornell University, President's Report, *Ithaca, N. Y.*
Dalhousie University, Calendar, *Halifax.*
McGill University Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal.*
University of Colorado, Journal, *Boulder, Cal.*
University of Illinois, Bulletin, *Urbana, Ill.*
University of Toronto, Trans. Engineering Soc., *Toronto.*
University of Washington Library, Bulletin, *Seattle, Wash.*
University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

Those marked † are paid for; all the others are exchanges.

Those marked * are bound at the end of each year, and placed on the shelves in the General Reading Room.

The Committee is pleased to note the increase in the number of members who avail themselves of the privileges of the Library and Reading Room of the Society.

The attention of members is called to the arrangement under which books may be obtained on loan from the Library by making a deposit equal to the value of the book. By special resolution of the Council, this privilege has also been extended to non-resident members, conditional upon the borrower paying the cost of express charges.

The Nelson's Perpetual Loose Leaf Encyclopædia which has been purchased for the Library is expected to be of especial value, in view of an arrangement whereby members may, through the Library Committee, avail themselves of the advantages of the "Nelson's Bureau of Research for special information."

The Crerar Card Index of engineering works, in the Crerar Library, is classified to date, and is available for bibliography.

A new set of subject cards of the Library has been made.

R. S. LEA,
Chairman.

Montreal, 13th January, 1910.

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURES FOR THE YEAR ENDING 31ST DECEMBER, 1908

Receipts.

Subscriptions :—			
Arrears	$2,390 00		
Current	7,089 00		
Advance	203 00		
Entrance fees	2,010 00		
		$11,692 00	
Rent of Room from Mining Institute from 1st November, 1907, to 15th Dec., 1908		520 84	
Rent of Room to Railway Club		25 00	
Interest :			
On Bank balance	56 65		
On Overdue fees	42 45	99 10	
Sale of Transactions and Periodicals		31 50	
Donations to Library		23 00	
Dividends—			
Can. Per. & West. Can. Mtg. Co. Stock	18 00		
Montreal Light, Heat & Power Co.	12 00	30 00	
Total Receipts on Revenue Account		12,421 44	
Cash Balance from 1907		3,453 95	
		$15,875 39	

Expenditure.

Transactions and Advance Proofs	$2,701 40		
Printing, Stationery, Binding and Diplomas	1,353 97		
Books, Magazines and Library Expenses	235 81		
Postage, Post Cards, and Telegrams	805 59		
Salaries of office staff	4099 52		
Caretaker's Wages	533 00		
Repairs and House Supplies	249 44		
Property and School Tax	189 43		
Water Rates	36 86		
Electric Light	147 66		
Coal and Wood	126 09		
Expenses, Annual Meeting	143 95		
Expenses, Ordinary Meetings	93 65		
Legal Expenses	225 00		
Examiner's Fees	100 35		
Students' Prizes	100 00		
Telephone	75 78		
Auditors' Fees	50 00		
Cabs, Cartage, etc	4 05		
Gas for Cooking	15 00		
Bank Commission	10 64		
Sundry Expenses	51 33		
Messengers and Express	60 14		
Gzowski Medal	20 94		
Branch Societies—Toronto	360 00		
" Quebec	122 00		
" Winnipeg	62 00		
Total Expenditure on Revenue Acct.		$11,973 60	
Furniture and Permanent Fittings		275 30	
Total Expenditure		12,248 90	
Balance in Bank, 31st December 1908	3,516 96		
Cash on hand	109 53	3,626 49	
		$15,875 39	

H. IRWIN, *Treasurer.*
Montreal, 13th January, 1909.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A., *Auditors.*

ABSTRACT OF RECEIPTS AND EXPENDITURES FOR THE YEAR ENDING 31st DECEMBER, 1909

Receipts.

Subscriptions :—		
Arrears	$2,023 00	
Current	7,963 00	
Advance	376 00	
Entrance Fees	2,190 00	
		$12,552 00
Rent of Room to Railway Club		10 00
Interest :—		
On Bank balance	94 30	
On Overdue Fees	117 15	
		211 45
Sale of Transactions and Periodicals		24 60
Donations to Library		22 00
Dividends :—		
Can. Per. & West. Can. Mtg. Co. Stock	10 80	
Montreal Light, Heat & Power Co.	13 00	23 80
Total Receipts on Revenue Account		$12,843 85
Prize Fund :—		
Surplus from Summer Excursions and Interest		107 67
		$12,951 52
Balance from 1908		3,626 49
		$16,578 01

Expenditure.

Transactions and Advance Proofs	$3,030 25	
Printing, Stationery, Binding and Diplomas	1,871 28	
Books, Magazines, and Library Expenses	178 61	
Postage, Post Cards, and Telegrams	710 59	
Salaries of Office Staff	3,482 15	
Caretaker's Wages	560 00	
Repairs and House Supplies	292 16	
Property and School Tax	205 15	
Water Rates	38 80	
Electric Light	267 87	
Coal and Wood	141 00	
Expenses, Annual Meeting	375 98	
Expenses, Ordinary Meetings	97 05	
Legal Expenses	89 96	
Examiners' Fees	100 00	
Students' Prizes	100 00	
Insurance	66 60	
Telephone	79 20	
Auditors' Fees	50 00	
Cabs, Cartage, etc.	3 15	
Gas for Cooking	25 70	
Bank Commission	29 94	
Sundry Expenses	120 95	
Messengers and Express	21 60	
Gzowski Medal	9 40	
Branch Societies—Toronto	102 00	
" Winnipeg	110 00	
" Ottawa	136 00	
" Vancouver	26 00	
Total Expenditure on Revenue Acct.		$12,321 39
Furniture and Permanent Fittings		110 00
Total Expenditure		$12,431 39
Balance in Bank, 31st December, 1909	$4,130 85	
Cash on hand	15 77	4,146 62
		$16,578 01

ERNEST MARCEAU, *Treasurer*

Montreal, January 14, 1910

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.
Auditors

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1908

Liabilities			
Nil			
Surplus at 31st Dec., 1907		$29,334 78	
Add			
Receipts on revenue acct.	$12,421 44		
Less expenditure " "	11,973 60	447 84	$29,782 62
Add			
Estimated increase in value of Arrears of Fees			1,000 00
Estimated value of additions to Library during year			370 00
			31,152 62
Less			
Written off for depreciation—			
Property acct. 1 per cent	161 55		
Furniture acct. 10 per cent	190 52		
			352 07
			$30,800 55

Assets			
Property No. 413 Dorchester Street West			
Balance at 31st December, 1907	$16,155 34		
Less 1 per cent. written off for depreciation	161 55		
		$15,993 79	
Furniture—Balance 31st Dec., 1907	1,629 99		
Add cost of additionals during year	275 30		
	1,905 29		
Less 10 per cent. written off for depreciation	190 52		
		1,714 77	
Books—balance 31st Dec., 1907	4,950 00		
Add estimated value of additions during year	370 00	5,320 00	
Arrears of Fees—estimated value at 31st Dec., 1908		3,780 00	
Canada Permanent & Western Canada Mortgage Corporation Stock		180 00	
Montreal Light, Heat, and Power Co. Stock		140 50	
Gold Medal		45 00	
Cash in Bank	3,516 96		
Cash on hand	109 53		
		3,626 49	
		$30,800 55	

H. IRWIN,
Treasurer.
Montreal, 13th January, 1909.

Verified
RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1909.

Liabilities.			
Nil			
Surplus at 31st December, 1908		$30,418 10	
Prize Fund Account		382 45	
		$30,800 55	
Add			
Receipts on revenue acct.	$12,843 85		
Less expenditure	12,321 39	522 46	
			$31,323 01
Less			
Written off for depreciation—			
Property account, 1 per cent.		159 93	
Furniture account, 10 per cent.		182 47	
			342 40
			30,980 61
Add			
Additions to Prize Fund			107 67
			$31,088 28

ERNEST MARCEAU,
Treasurer,
Montreal, January 14th, 1910.

Assets.			
Property No. 413 Dorchester Street W.			
Balance at 31st December, 1908	$15,993 79		
Less 1 per cent. written off for depreciation	159 93		
		$15,833 86	
Furniture—Balance at 31st Dec., 1908	1,714 77		
Add additions during year	110 00		
	1,824 77		
Less 10 per cent. written off for depreciation	182 47		
		1,642 30	
Books—Estimated value		5,320 00	
Arrears of Fees—estimated value		3,780 00	
Canada Permanent & Western Canada Mortgage Corporation Stock		180 00	
Montreal, Light, Heat, and Power Co. Stock		140 50	
Gold Medal		45 00	
Cash in Bank—			
Bank of Montreal (Savings Account)	3,214 67		
" " " (Current ")	426 06		
Prize Fund, Bank of Montreal	143 47		
" " Bank of Nova Scotia	346 65		
	4,130 85		
On hand	15 77		
		4,146 62	
		$31,008 28	

Verified
RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

Obituaries.

GEORGES FREDERIC BAILLAIRGE, M. CAN. SOC. C. E., was born in Quebec on the 16th October, 1824. He was educated at the Quebec Seminary. He began the practice of engineering in 1844, and was chiefly employed on public works, locating and enlarging canals, etc., etc. In 1879, Mr. Baillairge was appointed Deputy-Minister of Public Works for Canada, which position he occupied until 1891. In addition to his professional works he published several books, geographical, historical, biographical, and religious. He died at Joliette in December, 1909, at the age of 85.

ELSTNER FISHER, M. CAN. SOC. C. E., was born in Cincinnati, Ohio, on the 9th October, 1854. He was a graduate of the Naval Academy, Annapolis, and in 1876 was assigned to the U. S. S. "Vandalia" as midshipman. In 1882 he was with the U. S. Geodetic Survey, and made deep sea soundings from Boston to Rio de Janeiro, South America; having had charge of the scientific work of the expedition. In 1883 he was with the Pennsylvania Railroad on the construction of the Schuykill Valley Railroad, and later assistant engineer of the Maintenance of Way Department. In 1887 he was assistant engineer of the Michigan Central Railway. In 1897 he was appointed general superintendent and chief engineer of the Toronto, Hamilton and Buffalo Railway. He was a member of the American Society of Civil Engineers, and of various other American and Canadian societies. He died on 13th October, 1909.

ELZEAR LANTIER. M. CAN. SOC. C. E., was born in Montreal, 25th October, 1852. He was educated at St. Mary's College, Montreal, and at the University of Ottawa, Ottawa. Between the years 1876 and 1888 he was chiefly engaged in railway surveying and construction in connection with the Canadian Pacific Railway, the Montreal and Sorel Railway, the Quebec and Lake St. John Railway, and other roads. In 1888 he was admitted as a Provincial Land Surveyor for the Province of Quebec, and afterwards he was engaged in private practice, serving also for a time as Resident Engineer on the Bay de Chaleur Railway. For some years subsequently he was resident engineer on the Great Northern Railway, and later on the South Shore Railway. For some time he was a resident engineer on the Soulanges Canal. More recently he was engaged in private practice, making Quebec his headquarters. He died in Quebec in February, 1909.

JOHN MACCUNN, M. CAN. SOC. C. E., was born at Gourock, Scotland, on the 29th of September, 1866. He was educated at Victoria University, Liverpool, and articled pupil for four years in London and Greenock. He was assistant resident engineer on construction of the breakwater quay walls, dredging, etc., at Jersey. In 1889 he was assistant engineer, Uruguay Railways, South America. In 1894 he was assistant engineer, Canadian Pacific Railway, and on the staff of the Montreal Harbour Works. He was employed on submarine and masonry work in connection with a grain elevator for Mr. J. A. Jamieson. He was appointed principal assistant to the division engineer, Canadian Pacific Railway, in 1897. In 1901 he was on the Cape Breton Railway as chief of staff, and in charge of party. He was on the staff of the Intercolonial Coal Mining Company, at Westville, N.S. From 1906 to 1908 was office engineer of the Quebec, Montreal and Southern Railway, at Montreal. He died in Toronto in January, 1909.

WILLIAM J. MCCARTHY, M. CAN. SOC. C. E., was born in Ireland, on the 27th of April, 1849. He entered the Government engineers' staff upon the surveys and construction of the Intercolonial Railway, in 1867, and was transferred in 1877 to the Lachine Canal staff, and subsequently to the Montreal staff. He was construction engineer on the Canada Central Railway, for Messrs. Worthington & McIntyre. In May, 1879, he was engaged on the Government staff of the Canadian Pacific Railway, and from 1880 to 1885 was chief engineer for the contractors of Section B of the Canadian Pacific Railway. Afterwards he held responsible positions in charge of work for the Canadian Pacific Railway. In 1889, on surveys for the Temiscouata Railway. From 1896 to 1904 in charge of the surveys and construction for the Canadian Pacific Railway; the Cape Breton Extension Railway, Mackenzie, Mann & Co.; the Algoma Central Railway, and the Grand Trunk Railway. In 1904 he was appointed Government Inspecting Engineer for the Department of Railways and Canals on the western section, and in 1908 in the same capacity in charge of the Easterly Terminal Section of the Transcontinental Railway. He died in Ottawa, on the 28th October, 1909.

HURD PETERS, M. CAN. SOC. C. E., was born in Fredericton, N.B., on the 28th of August, 1830. He was educated at King's College, now the University of New Brunswick, from which he graduated as a Bachelor of Arts, and subsequently received the degree of Master of Arts. He was engaged in the construction of the European and North American Railway, from St. John to Vanceboro, and what is now the Intercolonial Railway, between St. John and Moncton. In 1854 he formed a partnership with the late Mr. J. E. Boyd,

M.Inst.C.E. In 1861 Mr. Peters was appointed city surveyor in St. John, and in 1863 became city engineer. He was one of the incorporators and a member of the first Council of the Canadian Socicty of Civil Engineers. He died at St. John, N.B., in August, 1909.

Edmund A. Rhys-Roberts, M. Can. Soc. C. E., was born at Cheltenham, England, on the 25th of March, 1859. He was educated in Cheltenham College, England, and was an articled pupil to John Middleton, architect, Cheltenham. From 1879 to 1880, chief assistant to Mr. Middleton. 1880-1881, assistant to C. H. Marsh, architect, Detroit. 1881-1882, assistant to Cock Bros. & Barry, mechanical engineers, Hamilton. 1883-1884, he was with the Hamilton Bridge Company. From 1884 to 1909, he was with the Dominion Bridge Company, Montreal. He was for several years assistant engineer, Hamilton Bridge Company. From 1894 to 1909 on the engineering staff of the Dominion Bridge Company, Montreal. From 1900-1903 he was Librarian of the Canadian Society of Civil Engineers. He died in Montreal on the 5th October, 1909.

Armitage Rhodes, M. Can.Soc. C. E. was born at Bergerville, on 2nd September, 1848. He was educated at Lennoxville School. His first engineering work was with the Cooper Hewitt Rolling Mills, Trenton, N.J. In 1870 he was in the service of the Powlton Coal and Iron Company, Pennsylvania, and in 1876 was engineer in the service of the Victoria Mines, at Sault Ste. Marie. In 1883 he accepted a position with Messrs. Peck, Benny & Company, Montreal, as superintendent of iron mills, a position which he filled until 1893. On the death of his wife, in that year, he removed to Quebec, in which city he resided until his death, on the 12th of February, 1909.

Frank Simpson, M. Can.Soc. C. E., was born in 1853. His first engineering work was on the preliminary surveys of the Welland Canal; on the construction and enlargement of which work he remained until 1883. Between 1883-1887 he was connected with engineering departments of several railways, amongst which were the Great Northern Railway, Temiscouata Railway, and Canadian Pacific Railway. He subsequently engaged in contracting, and formed a partnership with Mr. F. B. McNamee. His firm carried out the dredging of the Toronto Harbour, and the laying of the water pipes across the Toronto Bay. He was associated with Messrs. McNamee & Mann on the Lachine Canal enlargement, and other works. Subsequently, on his own account, he undertook various contracting works, including the construction of Keating's Channel, connecting Toronto and Ashbridge's Bay, and the laying of

the six-foot steel conduit in connection with the Toronto waterworks. He died in Toronto in the autumn of 1909.

W. McLea Walbank, M. Can. Soc. C. E., was born in 1856. He attended the engineering course of Queen's University, Ireland, in 1873, and subsequently that of McGill University, where he graduated, taking the degree of B.A.Sc., in 1877. After his graduation he practiced as an architect and land surveyor in Montreal for some years, during which he designed and carried out the sewerage of St. Gabriel Village, and constructed several factories in and near Montreal. Amongst the most important surveying work which he did was the subdivision of the Caughnawaga reserve. He was however, chiefly known to the engineering world in connection with the construction of the Lachine Land and Hydraulic Power Works, of which he was, after its completion, general manager. When this company sold out its interests to the Montreal Light, Heat, and Power Company, he became the vice-president and chief engineer of the latter company. He was one of the original members of this Society. In 1898 he was elected a member of the Council, and again served on the Council in 1903 and 1904. In 1906 he was Vice-President, and in 1907 was elected President of the Society. Mr. Walbank died after a short illness, on 28th November, 1909.

John Williams, M. Can. Soc. C. E., was born in Manchester, England, in the year 1841. He was educated in England and first came to Canada in 1870, when he entered the service of the Great Western Railway at Hamilton. After a sojourn of four years he returned to England. In 1887 he again returned to Canada, entering the City Engineer's Department, Toronto, as a mechanical draughtsman. After a short time he was promoted to the position of bridge engineer, and in that office supervised the construction of the bridges and docks for the city of Toronto to the time of his death, which occurred the 1st of May, 1909.

W. J. Erwin, A. M. Can. Soc. C. E., was born at Florence, N.Y., 5th December, 1882. He began his professional work as chairman and rodman on the Canadian Northern Railway, in 1899. In 1903 he was appointed resident engineer and remained connected with the Canadian Northern Railway in the same capacity until 1906, when he was appointed to a residency on the Grand Trunk Pacific Railway, retaining his connection with that road until shortly before his death, which occurred in 1909.

John Causley, A. M. Can. Soc. C. E., was born in London, England, 7th May, 1839. He graduated in the course of Civil Engin-

eering in the Union College, Schenectady, N.Y., in June, 1877. After graduation he was engaged in irrigation works and on railroad surveys in Colorado. He was assistant engineer on the Union Pacific Railway during the years 1880-1883. In 1884 he came to Canada and was admitted to practice as a Dominion Land Surveyor. In 1884-1885 he was an engineer on the construction of the Canadian Pacific Railway in British Columbia, under Mr. J. H. Gambie. Thereafter he was chiefly engaged in irrigation and hydraulic works and surveys in British Columbia. During recent years he was on the engineering staff of the City of Vancouver, and continued in the active practice of his profession up to the time of his death, on 3rd January, 1909. Mr. Causley was a notable example of a class of engineers to whom Canada stands indebted for a large amount of valuable pioneer work.

William Lewis Leslie, A. M. Can. Soc. C. E., was born in St. Catharines, Ont., on 2nd September, 1855. His first engineering experience was on the Welland Canal, and he remained connected with that work until the year 1888. In 1889 he was transferred to the office of the Chief Engineer of Canals, at Ottawa. During the earlier years of his connection with that office he was engaged in the design of canal locks, gates, valves, etc. In later years he was auditor of railway subsidies and chief clerk of parliamentary estimates. He died in Ottawa on 1st May, 1909.

Claude deB. Leprohon, A. M. Can. Soc. C. E., was the son of the late Dr. J. L. Leprohon, Vice-Consul for Brazil. He was born in Montreal on 2nd October, 1858. Mr. Leprohon was educated at St. Mary's College, and took a special course in the Science Faculty of McGill University. Between the years 1877 and 1885 he was engaged on the engineering staff charged with the construction of the Lachine Canal. In 1885 he was appointed assistant to the city engineer, Montreal, a position which he held until within a few months of his death, which occurred in Montreal on 12th April, 1909.

J. Francis Murphy, A. M. Can. Soc. C. E., was the son of Dr. Martin Murphy, C.E., I.S.O., late Provincial Engineer of Nova Scotia. He was born at Halifax, N.S., on 20th May, 1876; educated at La Salle Academy, Halifax, and at Church Point College, Digby, N.S. He began his professional career as rodman on the Woodstock and Centerville Railway, New Brunswick, in May, 1896. From February, 1898, to February, 1901, he was assistant engineer on the Midland Railway of Nova Scotia. During February and March, 1901, he acted as transitman on preliminary surveys on Middleton and Victoria Beach Railway, and in April, 1901, was employed to report

on the construction of Inverness and Richmond Railway, of Nova Scotia. In May, 1901, he made surveys for a shipyard at Dartmouth, N.S., and in June, 1901, was appointed on the engineering staff, Marine and Fisheries Department, Ottawa. In 1907 he was appointed district engineer in charge of works of construction, under that department, in the Province of Ontario, and was so engaged until his death, at Ottawa, 17th July, 1909.

MAURICE PERRAULT, A. M. CAN. SOC. C. E., was born in Montreal in June, 1857. His early engineering and architectural training was obtained in the office of his father, Mr. H. M. Perrault, with whom he was associated for many years. Later he became the senior partner of the firm of Perrault, Mesnard & Venne, Architects and Engineers. As an engineer he was connected with the earlier history of the Park and Island Railway. At the time of his death and for several years prior thereto he represented Longueuil in the Provincial Parliament. His death occurred in February, 1909.

T. T. SIMPSON, A. M. CAN. SOC. C. E., was born in Galt, Ont., on 31st March, 1887. In 1895 and 1896 he was in the employ of the Rogers Electric Construction Company, London, Ont. In 1896 and 1897 he was elected engineer for the D. C. Steam Navigation Company. In 1897 and 1898 he was in the engineering department of the Walker Electric Manufacturing Company, Cleveland, and from 1898 to 1902 in the engineering department of the Canadian General Electric Company. In 1902 he became resident engineer for the Capital Power Company, Ottawa, and engaged in a general consulting practice in Ottawa. He afterwards accepted a position as assistant engineer on the T. C. Railway at Ottawa. He died in Ottawa on 27th February, 1908.

HARRY MCLAREN, A. CAN. SOC. C. E., was born in Montreal, 17th January, 1841. He was a graduate of McGill University in Arts, and on graduation he was the winner of the Elizabeth Torrance Gold Medal. In 1893 he became an Associate of the Society. He was much interested in scientfic work, and was a member of the Montreal Natural History Society. For many years he was a member of the firm Copeland & McLaren, but more recently he conducted business on his own account as a dealer in sanitary and heating appliances. His death, which took place at the Royal Victoria Hospital in July, 1909, was the result of an elevator accident in his own warehouse in August, 1906.

H. E. CURRY, STUD. CAN. SOC. C. E., was born in Avondale, N.S., on 17th August, 1884. He graduated from the Royal Military College

in 1905, and was afterwards appointed on the Trans-Continental Railway survey, New Brunswick. His death occurred in 1909.

N. F. PEDLEY, STUD. CAN. SOC. C. E., was born in Cobourg, 7th September, 1884. He was the eldest son of the Rev. Hugh Pedley. He graduated in the course of Civil Engineering from McGill University. in 1906. After graduation he was engaged in survey work in Edmonton, Alta., and was for a short time assistant engineer on the construction of Lac du Bonnet Power Plant, Winnipeg. In 1908 he joined the engineering staff of the Illinois Traction Company, and was engaged in work for that company up to the time of his death, which occurred on 18th January, 1908, as a result of an accident.

J. ROBITAILLE, STUD. CAN.SOC. C. E., was born at St. Laurent, P.Q., on the 6th June, 1879. He was educated at Laval University and Ecole Polytechnique, from which latter institution he graduated in 1902. He was in the employ of the Dominion Government, Department Marine and Fisheries, Sorel. Mr. Robitaille's death occurred in 1906.

REPORTS OF COMMITTEES.

The several Committees appointed at the last Annual Meeting have reported as follows. These reports have been considered by the Council, and are submitted to the Annual Meeting for its action.

Establishment of Testing Laboratories.

The Committee on the Establishment of Testing Laboratories waited upon the Honourable the Minister of Public Works on 25th May last, and at the request of the Minister prepared a memorandum embodying the suggestions of the Committee in regard to the project in hand. This memorandum was submitted to Council, and by it transmitted to the Minister on 18th June.

Montreal, 18th June, 1909.

To the Hon. William Pugsley,
Minister of Public Works,
Ottawa, Ont.

Sir,

A Committee of the Canadian Society of Civil Engineers, consisting of Messrs. C. H. Keefer, J. Galbraith, G. E. Perley, H. M. Mackay, P. A. Gillespie, and J. A. Jamieson, waited on you on the 25th May last, in connection with a proposal that the Government establish a testing laboratory for all classes of structural materials.

The Council of this Society is of opinion that the establishment of a completely equipped testing laboratory by the Government for the investigation of structural and other materials, including models and portions of completed structures, would be a wise and economical undertaking for the Government, which is the largest consumer in Canada of structural materials. It would also be of great benefit to the public at large through the printed reports of the results of the investigations.

The Council desires to draw attention to the work which has been done, and is still being prosecuted in this direction, by the American Government through the establishment of a very fully-equipped testing laboratory at St. Louis, and of another at Pittsburg, with provision for tests of very large steel members of bridges, etc.

There is a great variety of Canadian structural material, about the physical properties of which very little is definitely known. If the characteristics of the materials were defined by the investigations of a well-organized Government laboratory, the results would

not only be of value to the Government in the construction of its public works, but would also be to the advantage of works undertaken by private enterprise.

The establishment of a central Government laboratory, with a permanent staff of specialists, should result in economy to the Government, as all departments would have the investigations and tests required for their work made therein, and outside expenses would be reduced to simple provision for field testing.

There are many cases where companies and individuals interested in public works would greatly desire to have tests of materials made by an authoritative bureau such as the Government would establish. In such cases a charge for testing could be made and applied towards reducing the cost of maintenance of the laboratory.

The Council of this Society trusts that, in the interests of the public works of Canada, you will favourably consider the establishment of a laboratory as outlined in the foregoing.

We have the honour to be, Sir,

Your obedient servants,

(Signed) G. A. MOUNTAIN,
President.

C. H. McLEOD,
Secretary.

The foregoing letter was acknowledged as follows:

Geo. A. Mountain, Esq.,
413 Dorchester Street West,
Montreal, Que.

Ottawa, 21st June, 1909.

DEAR SIR,

I am in receipt of your favour of the 18th instant, with regard to the establishment of a Government laboratory for all classes of structural materials, which will have careful consideration.

Yours truly,

(Signed) WILLIAM PUGSLEY.

No further action has been taken in this matter by the Committee or by the Council.

Usefulness of the Society, Etc.

The Committee on Usefulness of the Society and Educational Requirements has reported to the Council as follows:

The report of this Committee, presented at the last Annual Meeting, did not go beyond giving a certain amount of information on the matter, which it had been asked to study, and submitting a series of questions, 10 in number, for discussion.

Out of these 10 questions, No. 1 and No. 8 received a solution in the amendments to the By-Laws. Others were not considered by the Annual Meeting, and the only one left for the consideration of the Committee this year was that referring to individual action on the part of the members in producing papers and discussions on subjects of public or national importance, which would show the Society to be taking an active interest in such matters, and thus to bring about a better appreciation on the part of the public of the general usefulness of the Society.

What is required, and what has been felt both here and abroad for some time, is that engineers should have from the public the recognition which their opinions and services as builders of modern society entitle them to.

As to the best means of securing this end opinions vary, but it seems to be generally accepted that individual effort on the part of members of engineering societies must be the foundation, if engineering societies are to be publicly appreciated.

Your Committee has therefore thought that the first step to take was to ask some of its most qualified members to give at this Annual Meeting addresses dealing with the importance of the profession, its intimate connection with national development, and the relation of the engineer to the public.

The Society has standing committees on matters of general interest; others might be instituted which would cover all such questions. For example, the Committees on Transportation, on the Conservation of Natural Resources, Forests, Water-power, on Legislation affecting the Profession, etc., might be made regular organizations of our Society. They would study these subjects thoroughly and present reports, which would be printed, not only in our *Transactions*, but in newspapers and in the technical press.

Your Committee is of the opinion that the Society should without delay interest the management of some newspapers with a view to giving Society matters more publicity than they now have.

(Signed) ERNEST MARCEAU,
Chairman.

Montreal, 10th December, 1909.

Transportation.

The Sub-Committees on Transportation have presented the following reports:

*Sub-Committee on Transportation Routes.**

The Committee on Transportation Routes begs to report progress.

The subject is such a large and important one, and requires such a great amount of preliminary work, that it has been found impossible to make a report in detail this year.

Considerable work, however, has been done. Subdivisions of the Committee have been made, and these are actively engaged in gathering information as to the different routes by land and water, the cost of construction, maintenance, and operation of railways of different standards, and of different types of canals, steamships, barges, elevators, and other transportation equipment and appliances. These features must be accurately determined before your Committee can hope to submit a report on such an extensive and important subject.

Your Committee realizes that a report emanating from such a body as the Canadian Society of Civil Engineers must be accurate in every detail. The subject is at the present time being widely discussed, and the report, when issued, will probably be exhaustively criticised. Your Committee believes it is better to delay the production of such a report than to submit one which may be successfully attacked. A superficial report, one prepared without exhaustive research into the underlying conditions and the principles which must govern transportation in such an extensive and varied country, would be useless.

Your Committee appreciates that any system of transportation, to be successful, must not only be well designed, properly constructed and operated, but must be financially justifiable. Therefore, all the traffic conditions in Canada must be thoroughly studied, and as Canadian lines are in direct competition with those of the United States, the corresponding features in the latter must also be taken into consideration.

The mere enumeration of the work preliminary to such a report will give the members of the Society an idea of the magnitude of the task that has been assigned this Committee. When, in addition to the large amount of work to be done, it is remembered that each member of the Committee is a busy man, that the days of each are taken up with his own duties, and that the work must be largely a labour of love, often performed at considerable personal incon-

* Mr. W. McNab resigned the Chairmanship of this Sub-Committee, and Mr. W. F. Tye was appointed to replace him.

venience and expense, it will easily be realized that the results can only be attained slowly.

Your Committee believes that the question of transportation is so very large that no one report could adequately cover it, and that each route or combination of routes should be reported on separately.

The great extent of Canada from east to west, as compared with the comparative narrowness of the inhabited area from north to south, makes it essential that the important transportation systems must, to a very large extent, be on parallel lines east and west.

The St. Lawrence River and the Great Lakes, with their many hundreds of miles of navigable water, extending half-way across the continent, providing as they do cheap transportation, naturally divide the routes into two classes: "All-Rail" and "Lake and Rail." Our climatic conditions make the "Lake and Rail" routes available only during the summer months, but during this period such routes, equipped with suitable vessels of large carrying capacity, with proper terminals, wharves, elevators, warehouses, and other appliances for transferring cargoes from steamship to train, and *vice versa*, with rail connections properly designed and equipped, undoubtedly provide cheaper means of transportation than do the "All-Rail" routes.

During the winter months the "All-Rail" lines are of course the only ones available. These different classes of routes are, therefore, complementary to one another, and neither interferes with the usefulness of the other. Hence, in reporting on the economics of, say, the Georgian Bay Canal, it is unnecessary to compare it with the National Transcontinental Railway, but only with the all-water route from Fort William to Montreal *via* the Welland Canal, or water to Georgian Bay and rail to Montreal.

This factor simplifies the work of your Committee, and it is along such lines that reports are proposed to be made.

Your Committee believes that the question of Transportation Routes is the most important one now before the people of Canada, and that no commission or other body would be so well qualified to deal with and report on the subject as is a Committee of this Society. For these reasons we believe that the Committee, which is at present only a Sub-Committee, should be made a separate and independent one, with power to add to its number, and be known as the Committee on Transportation Routes.

(Signed) W. F. TYE,
Chairman.

Sub-Committee on Roadbed and Ballasting.

G. A. Mountain, Esq.,
Chairman, Transportation Committee, Can. Soc. C. E.,
c/o Board of Railway Commissioners,
Ottawa, Ont.

DEAR SIR,

There was a meeting of the Sub-Committee on Roadbed and Ballasting on Saturday, the 27th November. Those present were Messrs. H. A. Woods, L. A. Vallee, Prof. McLeod, and J. G. Sullivan.

It was the opinion of those present that the next work for the Sub-Committee would be the preparing of form of specification for construction of roadbed, following out recommendation (1) of last year's report.

As the specifications of the American Railway Engineering and Maintenance of Way Association (an international association, whose President is a Canadian, and whose members include practically all the chief engineers of railways and a great many other Canadian railway engineers) are standard, it was the opinion of the members present that, with slight changes to meet peculiar Canadian conditions, no better specification could be devised, and as the above association propose getting a new Manual for the year 1910, in which we hope to have some changes made, the members of the Committee agreed to add nothing to last year's report, it being understood that, if the Committee was continued, they would prepare the report for the following year embodying recommended specifications for construction of roadway.

Yours truly,

(Signed) J. G. SULLIVAN,
Chairman.

The Sub-Committee on Ties reiterates its report prepared for the 1909 Annual Meeting, as printed in pages 42, 43, and 44 of the Report of the Annual Meeting.

Sub-Committee on Rails, Fastenings, and Tie-Plates.

Montreal, January 10th, 1910.

Geo. A. Mountain, Esq.,
Chairman, General Committee on Transportation,
Canadian Society of Civil Engineers.

DEAR SIR,

In the report of your Sub-Committee on Rails, Fastenings, and Tie-Plates, at the last Annual Meeting, consideration was given to a comparison of the various standard and proposed sections in use by the railways of North America.

It was hoped that, during the year, sufficient information would have been obtained from the reports of the various railways to enable the Sub-Committee to present at least a study of the comparative results from the use of the various sections, but it has been impossible to do so up to this time.

Naturally, there was much diversity of opinion among the users of rails with respect to the typical sections which might promise the best results, and there was some hesitancy upon the part of the majority of railways to abandon their past standards and experiment with any of the proposed types.

Some of the railways, however, have made use of new types. The Canadian Pacific Railway have a new section embodying features of both the sections "A" and "B" proposed by the American Railway Association; and some of the railways in the United States have made experimental rollings with both sections "A" and "B," drawings of which were shown in the last report of your Committee.

One difficulty in making a comparison of the tests of the different sections was apparent at the start, and consisted in the variety of designs for the different drop testing machines in use at the various mills.

To overcome this variation of conditions, some of the mills voluntarily offered to construct a machine upon uniform and scientific principles, with the result that most of the mills have now installed such a machine, from which the tests made at one mill become comparable with those made at any other mill.

The description or specification and a drawing of this machine accompany this report.

It has been found, from a series of tests with the new machine, that the deflections obtained upon the test rails at different heights of drop are greater and more uniform than the deflections obtained upon the old machine under the same conditions, and, therefore, give more accurate information upon which to base a study of the properties of the rails.

It is the opinion of your Sub-Committee, therefore, that new specifications for rails should embody a requirement to use the Standard Drop Testing Machine.

It is to be hoped that within the next year the records of use of the various new sections will have been sufficiently far advanced and tabulated to enable an opinion to be formed as to the merits of the suggestions and principles embodied in their design.

Description of Drop Testing Machine.

1. The machine shall be arranged to allow a 2,000-lb. tup to fall freely at least 25 ft. on the centre of a rail resting on supports that can be adjusted to spans varying from 3 ft. to 4 ft. 6 in.

2. The anvil shall be a solid casting, weighing, with the attachments that move with it, 20,000 lbs. It shall be free to move vertically independently of the lead columns, and shall be supported on twenty (20) springs known as the standard "C" spring, without centre coil, as employed by the Master Car Builders' Association (their figure 5614). This spring has a free length of 8¼ in., an outside diameter of 5 $\frac{7}{16}$ in., and is made from a bar having a diameter of 1 $\frac{3}{16}$ in. These springs are to be arranged in groups of five at each corner of the anvil, and are to be held in place by hubs raised on the top of the base-plate, and by circular pockets on the underside of the anvil. Removable finished steel wearing strips shall be secured to the anvil and the lead supports for guiding the vertical movement of the anvil.

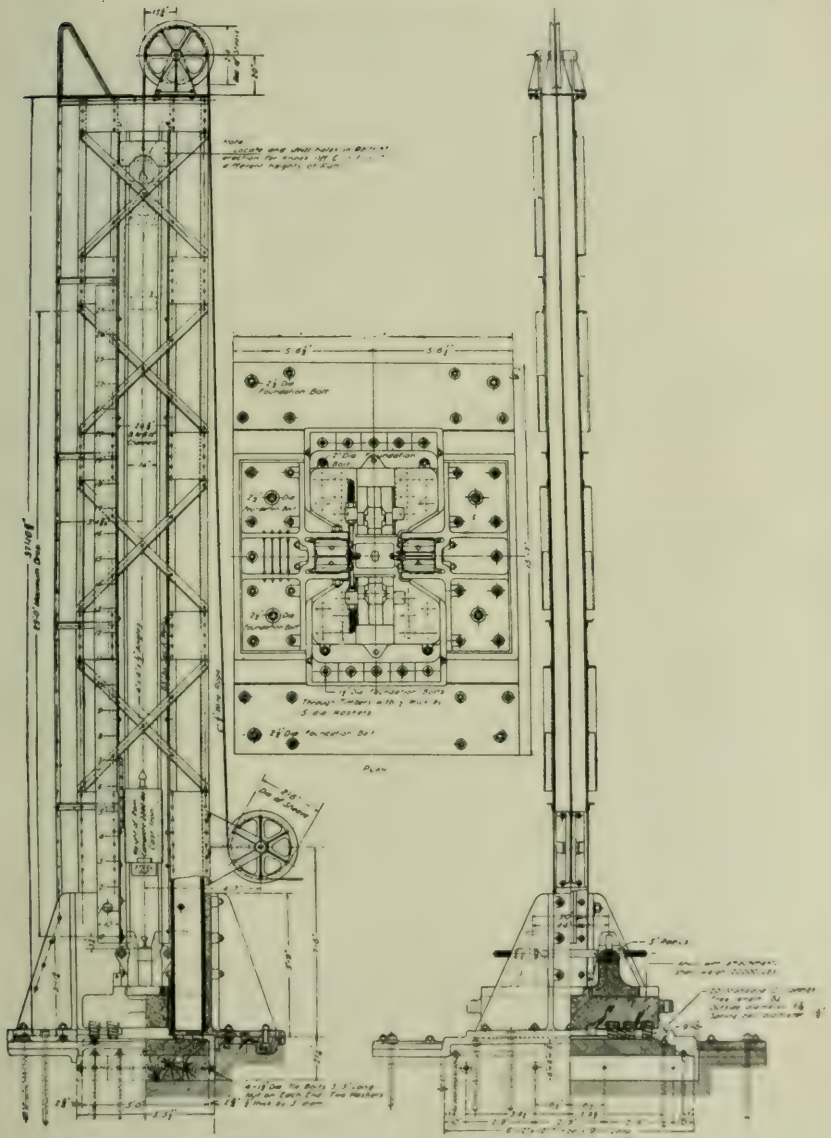
3. The base-plate shall be of cast iron or cast steel, eight (8) inches thick in the area covered by the anvil. It shall be firmly secured to the substructure by four bolts, two (2) inches in diameter.

4. The substructure shall consist of a timber grillage, resting on a masonry foundation. The grillage shall project nine (9) inches beyond the ends of the base-plate, and clear the columns at the side. It shall consist of one course of 12 in. x 12 in. sound oak or southern yellow pine, preferably creosoted, laid close and well bolted together. The masonry, preferably concrete, shall be not less than five (5) feet deep below the grillage, and be suitably supported on the subsoil.

5. The pedestals for supporting the test rail shall be substantial castings. The rail supports shall be removable pieces of steel, securely held in the pedestals, having an upper cylindrical bearing surface, with a radius of five (5) inches. The pedestals shall be adjustable to spans varying from 3 ft. minimum to 4 ft. 6 in. maximum between centres. They shall be securely held together, and so fixed to the anvil as to insure that the centre of span shall always coincide with the centre between leads.

6. The leads shall be firmly connected to the base-plate, and well braced. They shall be long enough to provide the prescribed free fall of the tup. They shall be provided with a convenient ladder and a plainly marked gauge, divided into one-foot intervals. The zero of this gauge shall be 5¼ in. above the top of the rail supports, and the specified height of drop shall be measured from this zero, irrespective of the height of rail being tested. One of the guides shall have a removable section, six (6) feet long at the bottom, so that the tup or tripping block can be readily removed.

7. The tup shall weigh, with the accessories that drop with it, 2,000 lbs. The striking die shall be steel, having a cylindrical striking face, with radius of five (5) inches, and a length of twelve (12)



STANDARD DROP TESTING MACHINE.

inches. The guide grooves shall have finished surfaces. The tripping head shall allow a grip of the tongs that will release at the exact height for which the tripping device is set, and that will be safe from accidental release while the test piece is being shifted.

8. The tongs and tripping device shall be arranged to release the tup automatically only; no manual releasing will be allowed. The tripping device shall be easily adjustable at one-foot intervals.

Yours truly,

HOWARD G. KELLEY,
Chairman of Committee

PROGRESS REPORT OF COMMITTEE ON STANDARD METHODS OF TESTING AND SPECIFICATIONS FOR PORTLAND CEMENT.

December, 1909.

The President and Members,
Canadian Society of Civil Engineers.

GENTLEMEN,

The "Standard Methods for Testing" and "Specifications for Portland Cement," submitted and recommended by your Committee last year and printed with the Report of Annual Meeting, also as a separate "booklet" for distribution, has now been in the hands of the members for some time.

A considerable number of reports have been received from laboratories in which tests have been conducted according to the methods recommended, the majority of cases showing satisfactory progress towards greater uniformity of results, particularly as to the initial and final set.

Investigations conducted during the year by members of the Committee clearly show that, if Clauses 34 and 35 are strictly adhered to, the personal equation is reduced to a minimum and dangerously quick-setting cement much more readily detected than under previous methods.

Communications have been received during the year from the Toronto branch, and also from several members, containing suggestions for improvement, some of which have been favourably considered by your Committee. Taken as a whole, the views expressed show the diversity of opinion on this subject, and clearly illustrate the difficulties in the way of preparing standard rules or specifica-

tions under which Portland cement can be commercially manufactured, and at the same time meet the views of individual engineers or consumers.

Your Committee does not consider it advisable to make any changes this year. It requests all members, in preparing specifications, to specify the use of the Canadian Society of Civil Engineers' Methods of Testing and Specifications, as recommended by Committee, and to consistently conduct all tests in accordance therewith, in order to secure greater uniformity in practice, and also to increase the prestige of the Society.

Respectfully submitted,

J. A. JAMIESON,
Chairman.

Discussion on the Report of Council.

Mr. McNab — Mr. Chairman, the third paragragh on page 17 states that Council "has suggested to the Citizens' Committee of Montreal the desirability of naming an engineer as one of the candidates for the Board of Control. It notes with approval the nomination of Mr. F. L. Wanklyn as one of the Committee's candidates." May I ask if the Council suggested any particular name to the Citizens' Committee?

The President — No, no name was suggested.

Mr. McNab — I think it would be in better form to put it that it notes with approval the nomination of an engineer, a member of this Society, as one of its candidates. I hardly think it dignified to come down to local politics. We all have great respect for Mr. Wanklyn, but I think it is one thing to recommend that an engineer be a member of this Board, and another to name a candidate.

The President — I do not think there is any local politics in it. It is only a nomination—not an election. It simply alludes to the nomination of Mr. Wanklyn, he being a member of this Society.

Mr. McNab — If Mr. Wanklyn did not get in, it would perhaps be a reflection on the Council's judgment. All that is required would be done by simply stating, an engineer and a member of this Society.

Mr. J. Kennedy — Mr. President, it seems to me that Mr. McNab is right. The report should simply indicate that it is the appointment of an engineer and a member of this Society that is approved of.

Mr. McNab — If it were a matter affecting the weal of the whole Dominion it would be all right, but in this case it is local. I understand that all the Council wishes is merely to approve of the appointment of an engineer. I therefore move that the name of Mr. Wanklyn be omitted and that the statement read "the nomination of a civil engineer, a member of this Society."

Mr. Leofred — I agree with Mr. McNab. I do not think the Society should endorse the nomination of any particular engineer, and so become a factor in the political muddle that has occurred in Montreal. It is dangerous ground for the Council to endorse the nomination of Mr. Wanklyn or anyone else.

The President — The Council did not recommend any particular man; it simply recommended that an engineer and a member of the Canadian Society should be placed on that board. Now, it has noted that Mr. Wanklyn was nominated, that is all. Surely it is perfectly plain.

Mr. J. Kennedy — It may be, Mr. President, that another engineer was also a candidate, so that it would be a little indelicate for us to name Mr. Wanklyn. I entirely approve of Mr. Wanklyn's nomination by the Citizens' Committee, but I do not think the Society should interfere in that way.

Are you proposing a resolution, Mr. McNab, to make that change? The President

The resolution I proposed was simply to leave the personality out. Of course, if the Council wishes to take the onus upon itself it may, but, if it commits the whole Society to it, that is another thing. Mr. McNab

I will second Mr. McNab's motion. Mr. MacPherson

But you are on the Council, Mr. MacPherson. The President

If we have made a mistake, I do not see why we should not rectify it. Mr. MacPherson

I will second it if there is any objection to Mr. MacPherson doing so. Mr. J. Kennedy

The motion is, then, to amend the report so that it shall read, "notes with approval the nomination of an engineer and member of the Society as one of the Committee's candidates." Carried. The Secretary

As there is a great deal of business before the meeting, I will ask you in discussing any subject to bring out all the points possible in one address, so that there shall not be a repetition. Of course, the right of reply will remain. The President

Moved by Dr. Galbraith, seconded by Mr. Schwitzer, that the report of Council be adopted, as far as page 13, of the printed report. Carried.

Moved by Mr. St. Laurent, seconded by Mr. W. Kennedy, jr., that the report of the library committee, pages 14 to 22, be adopted. Carried.

Consideration of the Treasurer's Report.

Mr. President, about the end of last year we had the misfortune of losing Vol. II. of the *Transactions* through fire. In the Treasurer's statement there appears the item "*Transactions* the Advance Proofs, $3,030." I would ask whether the second volume of the *Transactions*, which we have not received up to the present, has been paid for? Then, as to item 5, in previous years, and, in fact, up to last year, it has been the custom to set out in detail the salaries of the clerical staff and assistants. This year, I notice it is put down in one lump sum, and that last year's item is lumped in the same way. I would like to get the items that compose that sum of $3,482.15. The reason I ask the question with regard to the first item of $3,030 is that if Vol. II of the *Transactions* has not been paid for, and it amounts to the same sum as Vol. I., then that item should practically read $6,000 odd, and it would be charged to next year's account, the consequence being that instead of having a credit balance in the bank of $4,146 as against $3,626 last year, we really have something less than one thousand dollars. Mr. Leech

The Treasurer — We are always a volume behind, Mr. Leech.

As a matter of fact, this year we have made considerable payments in advance, but the account for the volume of the year is still an open account.

Mr. Thomson — Mr. T. K. Thomson.—Mr. Chairman, in the American Society of Civil Engineers, with only double the membership, they have about ten times the income, therefore, I think, the only criticism we can make, if our balance is small, is that the members are not charged enough.

Mr. Armstrong — Mr. J. S. Armstrong.—With regard to the *Transactions*, a very valuable paper by Mr. Swan was issued, and it has a number of fine engravings or photographs, but the details are left out. I would much rather have had the photographs left out and the details brought in. They are the part most interesting to us.

The Secretary — The cartoons were not intended by Mr. Swan for reproduction. He did not send them to the Society. I do not know whether he is going to do so for publication in the *Transactions* or not. Up to date, they are not in my hands.

The Treasurer — As to the salaries of the office staff, the figures are approximately as follows:

The Secretary, $1,350; the General Assistant, $900; the Stenographer, $500; the Assistant Secretary, about $700. Making approximately the total amount of the item referred to.

Mr. McNab — There is an item "Expenses, Ordinary Meetings, $97.05." I would ask what extra expenditure is involved beyond what is contained in advance proofs, salaries of office staff, caretaker's wages, water rates, and electric light ?

The Secretary — That is the special stenographer's fee for reporting the meetings.

On motion, the report of the finance committee was adopted.

Reports of Branches.

The Secretary read the reports of Branches as follows:

Toronto.

The President and Members of the
Canadian Society of Civil Engineers.

Gentlemen,—The Executive Committee of the Toronto Branch of the Society begs to make the following report for the year 1909:

The total membership of this Branch at the close of the year was 275, of which 65 were Members, 82 Associate Members, 8 Associates, and 120 Students. These represented the members of the Society within a radius of fifty miles of Toronto.

We regret to record the death of:

C. G. Milne, a Member.
John Williams, a Member.
Frank Simpson, a Member.
Stanley A. Ostrom, a Student Member.

The Branch, by an arrangement made last year, has had the privileges during this year of the rooms of the Engineers' Club of Toronto. All meetings but three were held there.

The meetings were limited to one a month, and held only during the winter months.

The papers read were as follows:

"Resistance of Pavements," by A. C. D. Blanchard.
"Waterproofing a Substructure for Gas Tank," E. B. Merrill.
"Water Filtration," Allen Hazen.
"Impact Stresses," E. A. Stone.
"Construction of the Lethbridge Viaduct," C. N. Monsarrat.

In addition to these papers and discussions two other meetings were held, at which the report of the Committee *re* Cement Specifications were considered, and recommendations made to the Parent Society.

Two meetings, which were entirely devoted to business, were also held during the year.

The Executive Committee has endeavoured to obtain engineers from other cities to address the Toronto Branch, and was fortunate in securing Mr. Hazen, of New York, and Mr. Monsarrat, of Montreal.

The Executive Committee has been anxious that something should be done towards procuring a building in Toronto, in which the various technical societies might unite, and is pleased to report progress in this direction.

No additions have been made to the library, as it was thought wise to await the outcome of the new movement.

The auditors' report shows a balance on hand of $86.46.

All of which is respectfully submitted.

J. G. G. KERRY,
Chairman.

E. A. JAMES,
Secretary.

Moved by Dr. J. Galbraith, seconded by Mr. T. C. Irving, that the report of the Toronto branch be adopted. Carried.

QUEBEC.

Quebec, 21st January, 1910.

The Secretary,
Canadian Society of Civil Engineers, Montreal.

Dear Sir.—I have the honour to report that since the 15th January, 1909, the date of the last Annual Meeting, the Quebec Branch of the Canadian Society of Civil Engineers has held fourteen meetings for general purposes, and for the election of new members.

This Branch has at present a membership of forty-one Corporate Members, four Student Members, and two Associates.

At a meeting held on the 19th February, a paper entitled, "Aids to Navigation between Quebec and Belle Isle," was read by Mr. P. E. Parent, and at a meeting held on the 5th March, a paper on "Forestry Preservation," was read by Mr. R. O. Sweezey. No discussion ensued.

The Annual Meeting of this Branch was held on the 21st January, 1910, at which Mr. A. E. Doucet was elected Chairman, and Mr. P. E. Parent, Secretary-Treasurer, for the ensuing year, to succeed Mr. L. A. Vallee, the retiring Chairman, and Mr. Hugh O'Donnell, the retiring Secretary. Messrs. A. Leofred and A. R. Decary were re-elected Members of the Executive Committee.

It is with regret that I have to report the deaths during the past year of two of the members of the Quebec Branch, Mr. Armitage Rhodes and Mr. Elzear Lantier, on whose demise suitable resolutions of condolence were passed by the Branch.

Yours truly,

(Signed) HUGH O'DONNELL,
Secretary.

Moved by Mr. Marceau, seconded by Mr. St. Laurent, that the report of the Quebec branch be adopted. Carried.

VANCOUVER.

January 12th, 1910.

The Secretary Canadian Society Civil Engineers,
Montreal, Que.

Dear Sir,—In response to your request for a report on the work of the Vancouver Branch of the Canadian Society of Civil Engineers for the past year, I beg to say that this Branch was formed last April with a list of about twenty-four Members and Associate Members, and this list has now increased to about thirty-two.

It was arranged that regular monthly meetings would be held in the rooms of the University College, commencing with October, but instead of these meetings a series of trips were provided for the members and their friends to places of engineering interest in the vicinity of Vancouver, including a trip to the Stave Lake Power Plant, now under construction for the Western Canada Power Company, and also an inspection of the interesting features in connection with the hauling of the heavy mains across the Second Narrows for the city water system from the Seymour Creek.

It is expected that the local Branch will have in the near future permanent quarters conveniently situated, where comfortable and convenient rooms and library will enable the Branch to be more fully appreciated both by resident and visiting members of the Society.

Yours sincerely.
H. K. DUTCHER,
Secretary-Treasurer.

Moved by Mr. Coutlee, seconded by Mr. E. V. Johnson, that the report of the Vancouver branch be adopted. Carried.

MANITOBA.

The Manitoba Branch reports:

Officers for 1909.—The officers for the year 1909 were as follows:

Chairman—Col. H. N. Ruttan.

Executive Committee—J. E. Schwitzer, C. H. Dancer, J. A. Hesketh.

Secretary-Treasurer—E. Brydone-Jack.

Regular meetings were held on 17th December, 1908; 7th January, 4th February, 4th March, 1st April, 4th November, and 3rd December, 1909; at which the following subjects were discussed:

1. The Design and Construction and the Bills for the Water Supply for the City of Winnipeg.
2. The Rankin Bridge.
3. Transportation Problem in Winnipeg.
4. The Transcontinental Railway.
5. The Construction of the Hydro-Electric Plant for the City of Winnipeg.
6. The St. Andrews Locks.

Discussions were conducted by Colonel Ruttan, E. Brydone-Jack, L. B. Merriam, S. R. Poulin, W. G. Chace, A. R. Dufresne.

On 6th November, through the kindness of Mr. A. R. Dufresne, the members of the Branch visited the St. Andrews Locks, on the Red River at Lockport, and examined the works there.

The Annual Meeting was held 3rd December, 1909, at which the following officers were elected for the year 1910:

Chairman—J. E. Schwitzer.

Executive Committee—C. H. Dancer, J. A. Hesketh, T. Turnbull.

Secretary-Treasurer—E. Brydone-Jack.

After the Annual Meeting a banquet was held in the Royal Alexandra, with forty-nine people present.

Attendance.—The attendance at the regular meetings varied from 14 to 47, with an average of about 26.

Growth of Branch.—The Branch started in 1908 with a membership of about 70, and now has 160 names on its list. This represents an increase in membership of over 128 per cent., while the influence it has exerted in increasing the membership of the main Society in this district has been very marked.

Advisability of Increased Grant.—In order to increase the efficiency of the Branch, and to enable it to uphold the prestige of the main Society, it is advisable that the grant from the Society should be increased, and it is hoped that the Society may see its way clear to substantially augment the amount at present refunded to the Branch, so that proper provision can be made for a library, a place of meeting, and experimental work.

E. BRYDONE-JACK,
Secretary-Treasurer.

The President — THE PRESIDENT.—One of the paragraphs of the report refers to the increase of the fees to the branch. That is a point that requires discussion.

Is there a recommendation in the report or simply a suggestion ? If we adopt the report do we not simply agree to consider the advisability of increasing the fees ?

I think so.

Col. Ruttan — Mr. President, the matter is one which will require a great deal of consideration. To save time, I move that the question of increased grants to branches be referred to the Council for the coming year, with instructions to look carefully into the matter and report at the next Annual Meeting.

Mr. Lumsden — MR. H. D. LUMSDEN.—I second this motion.

Mr. Dion — MR. A. A. DION.—I am in favour of the motion, but I should like a recommendation to be made that the Council increase the grants to the branches, if it can possibly be done. I should like an expression of opinion from the meeting. The Council could reject the proposal if thought desirable.

With our present fees an increase in the amounts given to the branches is out of the question. We could not possibly do it unless the fees were increased. The President

The problem might be solved in this way. The members of branches have the advantage of libraries and so on, and they might pay the full amount of the membership fee, as paid by resident members in Montreal. They now pay $2 less than the members in Montreal. Why not pay the same and get perhaps $2.50 or $3 back instead of the $2 we get now ?

I might point out, Mr. Chairman, that the $2 received from the parent Society does not begin to pay the expenses of the branches. Col. Ruttan

We know that by experience in Ottawa. The President

Mr. J. E. Schwitzer.—We are independent in the West, but we feel that it would help things out and be for the benefit of all the branches if the grants were increased. We have arranged with the librarian of the Manitoba University to be present one night a week so that the library may be available to members. This recommendation is not to bind the Society to give us an additional grant but we thought we would bring it before the Council for consideration. I think the effect would be an increase in membership, if we had an additional appropriation from the main Society to all the branches. Mr. Schwitzer

I could not agree to have my motion changed as proposed by Mr. Dion. There would be a conflict of opinion at once. The Treasurer of the Society says it is impossible to increase the grant. It is a matter that requires a great deal of consideration, and therefore I think it would be better to let the Council take it up in a business way and find out just what can be done, and make a recommendation to this meeting next year. Col. Ruttan

Then I think we had better leave this until the general business comes up. Meantime, we might adopt the report of the Manitoba branch. The President

Moved by Col. Ruttan, seconded by Mr. Schwitzer, that the report of the Manitoba branch be adopted. (Carried.)

Ottawa.

The Ottawa branch reports as follows:

Inaugural Meeting.—The inaugural meeting was held in the Russell House, Ottawa, on Monday evening, 18th January, 1909. Thirty-five members of the Canadian Society of Civil Engineers were present. On motion of Mr. Schreiber, seconded by Mr. Butler, Col. W. P. Anderson was elected chairman of the meeting. On motion, a Committee was appointed to ask the main Society for

authority to form a branch, to communicate with other branches as to their methods, to secure rooms, and to draft By-Laws. The following officers were elected to act provisionally:

Chairman—C. R. Coutlee.

Secretary—S. J. Chapleau.

Executive Committee—A. J. Matheson, A. H. N. Bruce, A. A. Dion, G. E. Perley, W. J. Stewart.

Second Meeting.—The second meeting was held in the Russell House, Ottawa, on the 25th March, 1909; twenty-seven being present. A communication was read from the Secretary of the main Society, stating that the application for the formation of the Ottawa Branch had been approved by Council, and the branch was, therefore, duly constituted. On motion the draft of the By-Laws was adopted and submitted to the Council of the Society, which in due course signified its approval. The Provisional Committee elected at the former meeting, were confirmed in office.

Membership.—Members, 49; Associate Members, 59; Students, 54. Total, 162.

Meetings.—There were two meetings held during the year.

On 2nd April, Prof. Adam Shortt, Chairman of the Civil Service Commission, delivered a lecture on the Conservation of Natural Resources. On 12th May, Mr. J. B. McRae, M. Can. Soc. C. E., delivered a lecture on the Development of Water Power at Orillia, and the Construction of the Chaudiere Dam at Ottawa. Both subjects were illustrated with lantern slides, and a discussion on Venturi tubes of large size followed.

The first Annual Meeting was held at the Russell House, Ottawa, on 6th October, 1909, twenty-five members being present. The annual report was read by the Secretary and adopted. The following officers were elected for the ensuing year.

Chairman—W. J. Stewart.

Secretary.—S. J. Chapleau.

Managing Committee.—Arthur Bruce, M. Donaldson, N. Cauchon, A. A. Dion, A. T. Phillips.

Rooms for the Branch have been opened and comfortably furnished, at 177 Sparks Street, where members may attend to correspondence or read the technical books and periodicals to be found there.

Ottawa, 25th January, 1910.

Moved by Mr. W. J. Stewart, seconded by Mr. Perley, that the report of the Ottawa branch be adopted. (Carried.)

The President I am requested to announce that a photograph of the members in attendance at the Annual Meeting will be taken at 3 p.m. on the steps of this building.

Gentlemen. His Worship, the Mayor of Ottawa, desires to extend an official welcome. We will suspend the business of the meeting for that purpose. The President

Mayor Hopewell.—Gentlemen, it is with extreme pleasure that I offer you a hearty welcome to the city of Ottawa, the capital city of this Dominion. I myself am not an engineer of any kind, although some people have been cruel enough at times to say that I am. However, I think I would have enjoyed the work of a civil engineer, the making of crooked things straight, high things low and low things high, and so on. I hope you will have an exceedingly pleasant time at your convention here, in the Capital; that it will not only be pleasant, but that you will also find it profitable. I grant you the freedom of the city, if you know what that is. I do not. You may have it if you can find it, and I say this without any reservation whatever, knowing that if you are successful in finding it you will not abuse the privilege, whatever it may be. It is with extreme pleasure that I extend to you heartiest welcome to this our city, and I may say now that I hope to have the privilege to-morrow evening, at your banquet, of saying another word or two. Mayor Hopewell

Your Worship, on behalf of the Canadian Society of Civil Engineers, I wish to thank you most sincerely for the very cordial welcome you have given us to this "Fair City with its Crown of Towers." I feel sure that the members will enjoy their sojourn here, and will derive much pleasure and benefit from the visits to be made to the industrial centres and scientific bureaus in the vicinity. On a former occasion, one of the Society's summer excursions, we all remember how fascinated we were by the beautiful scenery of the Capital and the many points of interest in its surroundings. This is the first time that we have had the pleasure of holding our Annual Meeting in the city of Ottawa, but I trust that at no distant date we shall return, and I feel sure, sir, from the words you have just uttered, that we will receive the same warm welcome from the Chief Magistrate that we have received at your hands to-day. The President

Consideration of Reports of Committees.

Moved by Dr. Galbraith, seconded by Mr. St. Laurent, that the report of the Committee on Usefulness of the Society be received. (Carried.)

Referring to the third paragraph in the report, I notice that the *Railroad Age Gazette*, a reputable journal in the United States, announces that the meetings of this Society are held "usually fortnightly," but the word "irregular" is also used, in regard to our meetings, in the list of meetings held by technical so- Mr. McNab

Mr. McNab cieties. Some societies are given as "fortnightly, excepting June to August." Ours is put down as "irregular." I would suggest that this be changed.

The President Your suggestion will be noted, Mr. McNab.

Moved by Mr. W. Kennedy, Jr., seconded by Mr. Perreault, that the report be adopted. (Carried.)

Mr. Leofred Mr. President, are there two separate reports? This one only refers to the usefulness of the Society. The educational requirements are not mentioned, although last year this subject and its discussion filled six pages of the Annual Report. I do not see any mention of these requirements, which I consider to be a most important matter.

The President This is the whole report of the Committee.

Sir Sandford Fleming is with us this morning. It was his intention to favour us with an address, and we placed it on the programme for 3 o'clock, but, owing to other engagements, Sir Sandford prefers to be with us this morning, and I am sure we shall be delighted to hear him.

Sir S. Fleming Sir Sandford Fleming.—Gentlemen, my words will be very brief. I had hoped to be here in time to follow the Mayor with a few words of welcome to the Society, but I found it impossible. I need not tell you what a great satisfaction it is to me to be here to-day. I am afraid I have not been a very good member, for I have been an absent member too often. I desire, on this occasion, to bid the Society a warm welcome to Ottawa.

I have been a resident of this city for a great many years—so many that I almost forget the number—since before Confederation, and that is now over forty years. I can go back no less than fifty-five years to my first sight of Ottawa. It had not then even the name of Ottawa; it was called Bytown. I am an old member of this Society, and of the sister American Society. For nearly half a century I have been a member of the American Society of Civil Engineers. Not quite so long as that a member of this Society, for it has not been in existence that length of time. It has been my privilege to witness a great deal of the engineering development which has taken place between the Atlantic and the Pacific, and I think I may be permitted to welcome the younger men to a noble profession. You belong to a profession of the first order. Although it is essentially a practical profession, you will find that its members cannot be too learned. In spite of all that has been done by engineers in the past, and what is being done to-day, I can see a wide field for this profession. There are between the oceans which bound Canada on three sides great engineering problems which have to be solved in the development of our great inheritance—that inheritance which has been freely given to us by

the great mother of nations for our children and our children's children to occupy and enjoy. With these few brief words, sir, I have the greatest possible pleasure in giving my humble welcome to the Society upon its visit to the Capital of Canada. Sir S. Fleming

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TRANSPORTATION COMMITTEE.

I have the honour to be Chairman of the Committee on Transportation, which is subdivided into four committees: (1) Transportation Routes, of which Mr. W. F. Tye, whom we expect here to-morrow, is Chairman; (2) Ties, of which Mr. D. MacPherson is Chairman; (3) Rails and Fastenings, of which Mr. H. G. Kelley is Chairman; (4) Roadbed and Ballasting, of which Mr. J. G. Sullivan is Chairman. Mr. Sullivan is expected here to-morrow. I will call on Mr. Kelley to present the report of his Committee, which will be of great importance to railway engineers. Mr. Kelley and his associates on the Committee are well qualified to handle this subject. The Committee was continued from last year, and has increased its findings. I would suggest that the Committee be continued, so that it may go on with the good work. The President

Sub-Committee on Rails, Fastenings, etc.

MR. H. G. KELLEY.—Gentlemen, the Sub-Committee on Rails, Fastenings, and Tie-plates presented a report last year giving the various standard sections of rails now in use and proposed. In considering a subject of this kind, an endeavour to cover the whole field in one year would make a very unsatisfactory report, which would require to be changed every year, and might not be read. The Committee has therefore decided to take up one subject at a time, the report on which will be sufficient to afford useful information to the members. The question of adopting a different rail section from that commonly used has been under consideration for a number of years. The American Railway Association, which includes practically all the railways in Canada and the United States, has, through a Committee, formulated some rail sections which the various roads proposed to try. The Committee therefore took up as the first subject for presentation the rail sections in use and proposed. The Committee considered that the next feature proper to present to the Society would be the manner of testing those rails and the results of tests. Unfortunately, in the past year the new sections have not been sufficiently used to give any results which could be formulated into a law. As to the proper section, the railroads which have used the girder section known as "A" are as strong in their belief that "A" is the one to be used as the com- Mr. Kelley

Mr. Kelley panies that have used "B" are in their belief that "B" is the one to be used. Early in the year we were met with the problem of comparing the physical characteristics of these rails when no two mills used the same drop-testing machinery.

An examination of the drop-testing machines at the different mills would show as many different types as there are mills; therefore, the energy exerted by the drop falling in the mill at Pittsburg was entirely different from the one at Nova Scotia. If the Canadian Pacific and Grand Trunk Railways, with their large mileages in the United States, have rails tested in the United States by one form of machine and others tested in Canada by another form of machine, the results may be confusing. After some discussion with the mill men, a typical machine was proposed, and several of them said, "If you can decide upon a machine that will give satisfactory results, we will adopt it." The old machines had anvils varying in weight, on foundations of different character. After it had been used for a few months and it had stood the shock of the weights, the anvil was likely to be loose and out of level, and the results on the same anvil would be different. The machine shown in the diagram accompanying the report was intended to overcome this. At first, it would seem that the result would not be satisfactory, because the weight of the anvil is supported on springs, but the tests have shown that an anvil supported in this way gives nearly uniform results, and the deflections of the rails from the same drop are greater than with the old anvils. It is rather astonishing that an anvil supported as described, and taking the blow of a two thousand pound weight falling fifteen or twenty feet, would afford a better and more uniform resistance than an anvil supported on a solid base. But that has been the result; the deflections are greater and the results more uniform. So that to-day we feel that the machine shown in this diagram is giving the results that we have sought for, and that this Society should advocate that rails be tested under this drop-testing machine. Many of the mills in the United States —in fact, nearly all of them—have put this machine in, and I believe the mills in Canada are going to do the same. I do not speak authoritatively, but I believe they will, because they have met us fairly on all the questions we have brought up for the improvement of the rail.

Mr. Schwitzer I would like to ask Mr. Kelley if that is the same drop-testing machine that has been adopted by the American Maintenance of Way Association?

Mr. Kelley Yes, it is the same machine. It was adopted by their Committee on Rails.

Moved by Mr. Schwitzer, seconded by Mr. Schreiber, that the report be adopted, and that the Committee on Rails, Fastenings, and Tie-plates be continued in office for another year and congratulated upon its report. (Carried.)

The President: These reports are valuable, and I am anxious to have the Chairmen of Committees present them when they are discussed. I think, pending their attendance, we will suspend this part of the work until the afternoon and go on now with general business.

On the request of Mr. Leofred, the Secretary read a communication from the Quebec branch with respect to the insertion in the Criminal Code of a clause protecting civil engineers in the performance of their duties in the same manner that land surveyors are protected.

Mr. Leofred: Mr. President, the Provincial land surveyors are applying to the Minister of Justice to get a clause inserted in the Criminal Code for their protection, as is afforded to Dominion land surveyors. Before Confederation there was such a clause in the law, but after Confederation there was only a reference to it left in the Dominion Lands Act. There is nothing at all protecting a civil engineer, and there is nothing in the Code making it a criminal offence to interfere with a Provincial land surveyor in the performance of his duties. The Boards of Land Surveyors in Ontario and Quebec have taken the matter up, and they have had answers from the Minister of Justice to the effect that he is considering the subject and likely to insert such a clause, giving the Provincial and Dominion land surveyors the same protection. I think, therefore, that this would be a good time to have a clause inserted protecting the civil engineer. The spirit of the law before Confederation was to protect civil engineers as well as land surveyors. The civil engineering of that time was chiefly done by land surveyors.

Moved by Mr. Schwitzer, seconded by Mr. John Kennedy, that this communication be referred to the incoming Council to deal with. (Carried.)

Mr. Leofred: Another matter which was referred to by the Quebec Branch was a publication in the Quebec papers reproducing part of the speech by Mr. Warburton, of Prince Edward Island, in which he compares the salaries paid to engineers in India, Australia, and other countries, with the salaries paid to engineers employed in Canada. His comparison shows that in this country civil engineers are paid much less for their services than in other countries. The Quebec branch thought it right that the Society should bring the matter to the attention of the Government. Mr. Warburton's speech can be found in Hansard.

The President I think the Society considers it a very worthy subject. The matter is to be discussed later on, and we may therefore leave it for the present.

Mr. Leech Mr. President, I will endeavour not to detain the meeting very long, but for the benefit of the members present who were not here this morning, it might be well to briefly outline the point I raised in regard to the paragraph calling the meeting. The gist of the argument is that at 10.00 a.m. on Thursday, or as soon afterwards as possible, the new Council is elected, and at 3.00 p.m., or as soon after as possible, there is a meeting of the Council. Last year's summons read: "At 2.30 p.m. an informal meeting of the Council." I take it as a constitutional point that a Council elected by a corporation such as the Canadian Society of Civil Engineers cannot legally meet until every member of that Council has been officially notified of his election and given the opportunity of attending a properly summoned meeting. A member may be in Montreal, Vancouver, or Halifax, and unless he attends on the speculation that he may be elected to the Council at this Annual Meeting, he is disfranchised. I claim that it is unconstitutional for the Council to meet and proceed to business until every member has been summoned to attend.

By-Law 33 says "The Council shall meet within one week after its election." The spirit of that is that a week is sufficient for the members to be notified of their election. Now, on Thursday, ten minutes after the Council is elected, they will appoint Committees on Finance and the other committees and officials of this Society. I claim that they are not entitled to proceed with that business, and I will go to the extent of taking the sense of this meeting that it should be an instruction from the Annual Meeting that the Council shall not proceed to the business of the Society until after every member has been notified of his election and summoned in proper order.

Mr. Tomlinson Mr. A. T. Tomlinson.—I second this motion.

Col. Anderson Col. W. P. Anderson.—Mr. Chairman, while Mr. Leech may be quite correct technically, it seems to me that he is only splitting hairs. For any advantage he will gain by the adoption of his motion, he will lose a great deal more. It is very difficult for any Council of the Society to get outside members to attend the meetings. Immediately after the Annual Meeting is the one opportunity of the year when it is possible to have a good representation of the outside members. I don't quite understand why Mr. Leech brings up this point. Technically, he may be right, but in practice the adoption of this motion would be a detriment and not an advantage to this Society.

I quite agree with Col. Anderson that while Mr. Leech may be right technically, I think the practice is quite within the letter of the By-Law. There is no By-Law to the effect that no meeting of Council shall be called unless every member be notified. Nothing is said about notification. Therefore, I think there has been no illegal meeting, and it is true that we have a better chance of getting outside opinion after the Annual Meeting than at any other time. I think the Council has worked the By-Laws in such a way as to be a benefit to the Society, and although I admit that Mr. Leech has indicated a point that might be open to abuse, I do not think that this has occurred. Dr. Galbraith

Mr. President, I have been on the Council for more than half the years of its existence and the practice has worked exceedingly well. For the reasons that have already been given, I think it should be continued. Mr. J. Kennedy

Mr. F. P. Shearwood.—Mr. Chairman, could not the objection be overcome by having the election before the Annual Meeting, with a provision that the incoming Council shall not take office until after the Annual Meeting? Mr. Shearwood

Mr. Chairman, I will ask Mr. Leech, if he knows a specific instance where hardship has occurred from the way the Council has managed the matter. Col. Ramsay

Mr. R. McColl.—Mr. President, the mover overlooks the fact that a member, before being nominated, is required to signify his intention to accept the nomination. Therefore, he knows about the meeting and if he can be here he will be. It is the custom in most institutions to hold a meeting of the directors immediately after the Annual Meeting. If there is anything wrong the better way would be to legalize the present practice by changing the By-Law. Mr. McColl

Mr. W. J. Francis.—Mr. Chairman, I would ask Mr. Leech if his objection is confined entirely to the words "formal" or "informal." As I understand him the whole matter turns on those two words. Mr. Francis

Mr. Leech.—Mr. President, I have not anything to add. I notice that last year the words were "an informal meeting of the Council" and this year merely "a meeting of the Council." I asked for information whether business took place at an informal meeting. I found that it did and consequently I raised a constitutional objection against the Council proceeding to business when the members had not been notified. I did not suppose that I would carry the meeting with me, but I am still of opinion that the members of the Council should have this franchise. It may be that you get a larger meeting, but there are other members who are absolutely disfranchised. Mr. Leech

I would like to say a word with regard to this motion. There is a notice in the programme that there will be a meeting of the newly elected Council. If two members were here from The President

The President Vancouver, and a third who has been elected is in Edmonton and cannot get here, it would take two weeks to notify him and bring him here; meantime the Vancouver members would not stay, so that we would gain one and lose two. Again at the next meeting the minutes as read will have to be adopted.

Mr. Schwitzer MR. J. E. SCHWITZER.—I agree with what Col. Anderson has said. By having the meeting immediately after the Annual Meeting we get a larger attendance and get members from a wide territory. If the course proposed is adopted we would have only local members.

The President Are you ready for the question?

Mr. Leech It is not necessary to put the motion, Mr. President. I will withdraw it, with the consent of the seconder and the meeting.

Mr. Irving MR. T. C. IRVING.—I would ask, Mr. President, whether the committee dealing with the standardization of specifications has been disbanded ?

The Secretary It was not reappointed at the last annual meeting.

Mr. Irving I would suggest, Mr. President, that a committee be formed to consider the standardization of cast iron water pipe specifications. Nearly every engineer in this country at some time or other has to do with cast iron water pipe, and when he looks into the specifications, he finds that in Canada we have no recognized standards. The result is that he gets up a specification of his own, and, as a rule, it is somewhat rambling and cumbersome. The pipe foundries refer back to him two or three times, and he is probably told that they have not this design in stock. Again a standard specification would be a good thing for the foundry, because they could stock their pipe and if an engineer wanted pipe in a hurry he could order the Canadian Society specification and get it. There are two or three specifications in use in the United States; those of The American Waterworks' Association, the New England Waterworks' Association, and the American Society for Testing Material. If we standardized the cast iron water pipe specifications in this country, it would be beneficial both to the engineers and the manufacturers. I have spoken to several engineers and they are heartily in favour of it.

Mr. Leofred I have often felt the want of such a standard specification. I make a specialty of waterworks, and we have always to make our own specifications. Frequently when the dealers sell pipes they find a way out of their contract because there is no standard specification. I believe it would be advisable to have a committee to investigate the matter and make a specification for Canada.

Mr. J. Kennedy Mr. President, I think we should go very cautiously about standardization, because it means stereotyping. Our profession is essentially one of progress, and therefore we should be careful about standardizing. A most instructive lecture has been given recently on that

subject by Prof. Unwin, which we would do well to consider. Good specifications have been adopted by the American Waterworks Association, and by the New England Association. It is very easy to take one of those and adapt it to particular conditions. Let us go slowly about making another specification. Mr. J. Kennedy

Mr. W. N. Dietrich.—In support of the suggestion I may say that some time ago I had charge of installing quite a large system of water works, and we had a great deal of trouble in getting the pipes to suit. I have no doubt that standard specifications would be of use. Mr. Dietrich

We might form a committee on standard specifications again if Mr. Irving will move that. The President

I would move that the committee deal with water pipe only. If they go on standardizing every kind of engineering material they would have a heavy job. I refer merely to cast iron water pipe specifications. I think that could be done in about two hours. The trouble with committees of this Society is that they are dealing with such big propositions that they get overwhelmed. Mr. Irving

Before we adjourn, Mr. President, I recollect that about four years ago a committee was formed, of which Col. Anderson was a member, and I was appointed a member, under Major Stewart as convener, to consider the question of engineering and military defence. I received a notice of my appointment to that committee but since then there has been an absolute blank. What has become of it ? Mr. Leech

The Chairman never did anything in connection with the matter, so far as I know. The Secretary

It being one o'clock, we will adjourn now to meet again at three p.m. The President

At 1.30 p.m. the members of the Society were entertained at luncheon by the Ottawa Branch, in the dining room of the Russell House. Mr. W. J. Stewart, Chairman of the Ottawa Branch, presided. The luncheon was attended by upwards of 200 members.

AFTERNOON SESSION.

Gentlemen, before adjournment we were discussing the question of standard specifications, and Mr. Irving had the floor. The President

Moved by Mr. T. C. Irving, Jr., seconded by E. A. James, that a committee composed of Messrs. R. S. Lea, O. W. Smith, N. J. Ker, and the mover and seconder, be appointed to frame standard specifications for cast iron water pipe, and to report to Council. Also that the Council shall have full power to deal with this report in regard to its adoption, amendment, or otherwise, as they deem best.

Carried.

REPORTS OF COMMITTEES (*continued*).

Establishment of Testing Laboratories.

The President

THE PRESIDENT.—The next report is on the establishment of testing laboratories. Mr. Keefer is chairman of that, but I am sorry to say that he is ill and will not be at this meeting. I will ask Dr. Galbraith, a member of the committee, to take charge of this report.

Dr. Galbraith

Mr. President, I am sorry to say that I am not in as close touch with the work of the committee as I ought to be. A conference was held with Hon. Mr. Pugsley, and the representations that you see here were made to him and nothing more has been done. What the Society is interested in is, what further action should be taken. What we have to settle is whether we intend to push the question, whether we wish to frame a specification for the work of the Government, so to speak, and study the question to such an extent that we could give the Minister an estimate of the cost. Unless we do something of that kind I feel sure that nothing more will be done. The subject is such a large one that I doubt if any single member of the committee has time to go into it. Unless we can get some person who is extremely well qualified for the purpose, to do the work, we are not likely to get much done. It is necessary to come down to details, and it is for you to say what further shall be done.

Mr. Leofred

Mr. Chairman, I think, after reading this report, that the Society cannot say very much as yet, or the Government either. An estimate of cost is necessary. I think the latter part of the report might cause an encroachment on private practice. I do not think the Government should undertake private testing work for pay. There is nothing very practical in this report, and certainly nothing that would induce the Minister of Public Works to take any action in the matter. There is no estimate of cost in regard to building and equipping, or in reference to the cost of maintenance. Neither is there any clear statement as to its usefulness to the country. Such information seems necessary before going to the Government.

Mr. St. Laurent

Mr. President, I think we should seek the establishment of a testing laboratory, not for commercial purposes, but for the advancement of science and of our technical knowledge. I think the committee should be continued and instructed to go into details, if possible. They should be able to give the Government an estimate of the expenditure that would be involved for proper quarters for the laboratory, proper equipment; the wages to be paid the staff, and the cost of maintenance. The committee should go into the question of what subjects are to be investigated and what

matters tested for the general advancement of our knowledge. If we go to the Government prepared with these details I think we stand a good chance of having a laboratory started. Mr. St. Laurent

I have a suggestion, Mr. President, that might move us one step forward. I think we might well urge upon the Government to appoint a commission to visit the United States laboratory at St. Louis, which is the one of which I have the greatest number of reports. There is another also at Pittsburg. I think it would be proper for the Society to urge the appointment of such a commission and the Government would then be in a position to go on without further expense to this Society. Dr. Galbraith

It might be well that they should enquire into the methods of the German Government as well. Not long ago there was a long article in the *Canadian Engineer* describing the institutions in Berlin. These are very extensive, probably more so than the Dominion requires at present, but they are on the lines of education, testing, and experiment, that the Government should undertake. Mr. Armstrong

Mr. Chairman, in the report of the committee made to the Government I think they omitted to refer to one rather important point. A great deal of the construction work in Canada is built to the specifications of the Dominion Government, or it is supervised by or subject to the approval of the Government. A testing laboratory and competent staff of scientists would be of great advantage in carrying out this work. Mr. Shearwood

Moved by Dr. Galbraith, seconded by Mr. Leofred, that the committee on the establishment of testing laboratories be continued, and that they be instructed to urge upon the Government, through the Council, the desirability of appointing a commission to visit the United States Government testing laboratories at St. Louis and Pittsburg, and also government laboratories in other places, for the purpose of gaining the necessary information precedent to the establishment of a Canadian laboratory.

Carried.

Transportation: Sub-Committee on Ties.

The next is the report of the Committee on Ties. This question was brought up last year. The Committee had done a good deal of work, and it has reported to the Committee on Transportation. The Committee on Transportation failed to do its duty, and the Sub-Committee on Ties was continued. They sent in the same report as last year. You will find the report in this year's The President

The President proceedings, page 42. I will ask Mr. MacPherson, the chairman of the Committee, to assist me.

Mr. MacPherson We were asked to make a report on Ties, and that is such a large question that we scarcely knew where to begin. Therefore, we took it up in a general way, as to the reserve of the material available and how to conserve the supply. We thought the Society would make certain recommendations to the Government, but I do not think any such action was taken. However, the Government has appointed a Conservation Commission which is taking some of the steps recommended in this report, although the report was not brought to the attention of the Government.

The President I would suggest that this Committee be continued, and that it should go into more details of the kind of ties, their dimensions and so on. I do not think we can put it in any better hands.

Mr. Kirby Mr. C. C. Kirby.—I would ask whether it would not be advisable to go into the question of preservation of ties. I mean the artificial treatment to add to the life of the tie.

Mr. MacPherson If the Committee is continued their instructions should be definite and not cover too much ground.

Moved by Mr. J. L. Weller, seconded by Mr. E. J. Walsh, that the Committee on Ties be continued, and that it confine its attention more particularly to the matter of the artificial preservation of ties, their size, and the timber best suited to the purpose.

Carried.

Transportation: Sub-Committee on Roadbed and Ballasting.

The President The next report is that of the Committee on Roadbed and Ballasting, under the Chairmanship of the Assistant Chief Engineer of the Canadian Pacific Railway, Eastern Lines. I regret that Mr. Sullivan is not present. He is expected here to-morrow, but perhaps we had better not defer these reports. This Committee is composed of men who are thoroughly posted on the subject. I will ask Mr. McNab to come forward and defend their judgment.

Mr. McNab Mr. President and gentlemen, on glancing over the report you will see that it refers to one particular work which this Committee has undertaken to do, namely, the preparation of a specification for roadbed, including ballasting. A Committee composed of men engaged in the hurly burly of railway activity are reviewing a specification covering existing United States practice. This review is to be published next spring. Before being published it will have been presented for discussion and confirmation to a convention of probably three or four hundred practical engineers. As these engineers are connected with railways in every portion of the North

American Continent, from the Gulf of Mexico to the Yukon, and from the Atlantic to the Pacific, it is felt by this Committee that they can very safely wait until they get this specification, and if there is anything deficient in regard to the conditions in Canada, then we can supplement it to suit this country. It is easy to criticise when you have something tangible before you, and when this manual of recommended practice comes out I think you will agree with me, that it should be very complete. To-day the manual of recommended practice of the Maintenance of Way Association of America is practically a text-book, part of the curriculum of the engineering courses of our universities, and is looked upon for the time being as an up to date text-book upon the subjects treated. The Society then may safely wait until our next meeting when there will be something definite to present to them in reference to the Specification for Roadbed and Ballasting, as applicable to Canada. The President

I would like to make a suggestion in regard to this report. Referring to the Maintenance of Way Association the words are used, "An International Association whose president is now a Canadian." That might mean that he was formerly something else. I think the reference to nationality should be omitted.

If Mr. McNab's Committee is going to get out of their work so easily, why should not the Committee on Ties do the same thing ? Mr. MacPherson

You have your instructions. It is your own affair where you get your information. The President

Moved by Mr. John Kennedy, seconded by Mr. Weller, that the report of the Sub-Committee on Roadbed and Ballasting be received and the Committee be continued.

Carried.

Transportation: Sub-Committee on Transportation Routes.

The next is the report on Transportation Routes. I regret that Mr. Tye is not here, but I preceded him as chairman of the Committee and know something about it. The Committee had a big subject to deal with, but they have gathered a large amount of information. They went into the question of the economical routes from east to west, and not only the rail lines but also rail and water, and water transportation. The members constituting this Committee have associated with them in their work gentlemen, not members of the Society, who are prominently connected with the leading steamship and railway lines of the country. You will notice a suggestion at the end of the report that this should be a Committee of the Society and not a sub-committee of a larger Committee on The President

The President transportation. I think that suggestion should be carried out with regard to each of the sub-committees on transportation. As a matter of fact the sub-committees have had to do their work independently, and they should be continued in that way. Mr. Tye only took office in the autumn, but he has done a great deal of work. Still there is a great deal more to do. I think the old Committee on Transportation Routes should be eliminated and the four sub-committees continued as committees of the Society.

Mr. Armstrong Mr. Chairman, at last year's meeting it was suggested that the Council should prepare resolutions in regard to these things beforehand. I was in hopes that they would have done so, and that these resolutions would have been appended to the reports so as to facilitate the discussion. With regard to this transportation committee I have sketched a resolution. I move that the sub-committees on transportation routes be enlarged and that one part shall take up the study of transportation routes and the other terminals thereof; and further that a member of each division shall be appointed and given an adequate fee for devoting an extra amount of time for collecting information under instructions, the reports to be considered by the full committee, and the special members finally to edit the reports.

Transportation Routes form an immense subject, so also do Terminals. They are correlated and necessary, the one to the other. It is necessary to deal with both adequately or nothing special can be accomplished.

The President The Committee on Transportation gathered a great deal of information on terminals, such as Montreal. I have no doubt, it is included.

Mr McColl Mr. President, private companies are dealing with these questions, and paying large sums for information of this kind. I would like to know just what is expected of the Transportation Committee.

The President I do not think they have any definite instructions as to reporting, but, no doubt, have in view reporting on the transportation question from an economic standpoint. Mr. Coutlee is a member of the committee and, perhaps, will assist us.

Mr. Coutlee I think I am the only member of the committee present. The idea has been to investigate on rather new lines the subject of transportation in Canada. We find that the people who make the freight tariffs know nothing about the cost of transportation. That is, railway and boat tariffs have grown up on a system of taxing the freight all it will stand. The idea in this investigation has been to study the physical features of the railway and water routes and their combinations, and get at the actual cost of haulage from two or three different standpoints. Perhaps the best known system is that of train mileage, not cost per ton mile; that is very

deceptive when the distance is long and, we are, therefore, putting it to one side to some extent, although it will be considered also. As far as railways are concerned the work will be cost per train mile. There may be a very good road, with good grades, light curvature, a fair amount of traffic and still the cost per train mile not less than a second class road which has a light traffic. That is, supposing it was 90 cents per train mile, you would find it go up to, perhaps, $1.15 on large roads. There is not a very great margin between the two. We have decided to take it up on that basis, and to do that we must get the physical features, and that is something on which we wish to appeal to all the members of this Society. We would like to get everything concerning the physical features of the railways. The crossing of the isthmus of Ontario presents the first obstacle to most of the traffic in this country. You can either go by boat to the west coast of it and cross it, or you can go around by boat. We want to get at, not the tariff charge, but the cost of carrying the present bulk of traffic, and also the cost later on of carrying that traffic when it increases somewhat. The investigation will take a little time, but I hope when accomplished it will contain some very valuable information. Mr. Coutlee

Is any attention given to water routes? Mr. J. Kennedy

Yes, the water routes are to be taken up also. I merely mentioned railways because the physical features are more easily investigated. Mr. Coutlee

Mr. J. G. Sing.—I beg to move the adoption of the report, and in doing so, I may say that I have always felt that engineers are qualified in every way to give an expression of opinion on the transportation of any country. The engineer is engaged in transportation from the time he begins practice, or even in his student days. It is the duty of an engineer connected with transportation to make a complete study of it. He has to deal with it in a practical way. Canada has, undoubtedly, the greatest coast line and water system of transportation in the world. She has a waterway of 6,500 miles with only one land break of 150 miles. The field is a large one and can hardly be comprehensively dealt with in one report. I think the idea of having the branches connected with the parent society, assist in this matter is a very wise one. The branches are scattered from the Atlantic to the Pacific and are all equally interested in this question. I have much pleasure in moving the adoption of the report. Mr. Sing

Mr. President, notwithstanding Mr. Coutlee's explanation I do not quite understand the proposals of the Committee. Does the Committee intend to report the best route for transportation? Mr. Coutlee said that the first thing was to cross the isthmus of Ontario. Does he propose that they should select the route or that they shall report the cost of the various methods of transporta- Mr McColl

Mr McColl tion? It may be that a report can be got of a practical nature but I cannot quite see how it is to be done. He also spoke of finding the cost per train mile on different classes of railways. Is the report to be in the nature of a paper to be discussed and to give the Government and the people generally an idea of the best method of transportation ?

Mr. Coutlee The report will be so drafted as to put the results of the investigations and the conclusions arrived at before the profession.

Mr. Lamb Mr. H. J. Lamb.—I have pleasure in seconding the motion.

The President You have heard the motion. Under it the Sub-Committee is to be formed into a Committee of the Society. Motion carried.

I have just received a communication from Mr. T. C. Keefer, Jr., grandson of Mr. Keefer. He says that his grandfather is unable to undergo the exertion of coming up the stairs to this room. He extends his good wishes to the Society, and asks to be relieved from addressing you on this occasion. We are glad indeed that Mr. Keefer is still with us in good health. We appreciate the charm of his personality, and the tremendous amount of work he did in the organization of this Society. I will ask Mr. Dodwell to add a few remarks to mine.

Mr. Dodwell Mr. C. E. W. Dodwell.—Mr. Chairman, I may say that I regard Mr. Keefer as the Grand Old Man of the profession in Canada, and one of the greatest engineers we have had in the country. I had the great honour of being associated with Mr. Keefer in the formation of this Society some 23 or 24 years ago. I was one of the youngest of the original Committee of Nine, and Mr. Keefer has always been a very great friend of mine, professionally, personally, and in every other way. It was with me as my first assistant that his lamented son, Harold Keefer was killed. I was building the bridge at Ste. Anne's and Vaudreuil. I sent Harry Keefer to lay out the bed plates on the piers and he had the misfortune to slip and fall from a pier. He thought at the time he was not seriously hurt, but he sank into unconsciousness and died. I shall never forget the grief of Mr. Keefer on that occasion. Mr. Keefer has, I think, done more for the profession in Canada than any other man. He was our first President, and no one has deserved more thoroughly the universal respect of the country, not only of the engineers but the whole public. He did noble work in connection with the Paris Exhibition, and it was his services there that earned him his well merited C.M.G. I hope that another year, we may still have Mr. Keefer with us, to cheer us on in the work of the Society. As long as he lives we shall respect and love him, and I regret very much that he is not able to be with us to-day.

Mr. Thomson Mr. T. K. Thomson.—The American Society of Civil Engineers has been proud to have Mr. Keefer for their president.

Gentlemen, the scheduled business of the day is practically over, except that I trust some one will move a resolution that the Sub-Committee on Ties, Rails, and Roadbeds shall be made a committee. That is, that they shall report through the Council only. The President

Mr. President, Mr. Leech confessed this morning that he was a member of a committee that had never done any work, and, in fact, he did not know whether it was still in existence or not. I would like to read a short extract from the report of the Annual Meeting of January 9th, 1907: "Mr. Stuart Howard called the attention of the meeting to the desire of the Militia Council to inaugurate an engineering reserve corps, and moved the following resolution, which was seconded by Mr. W. McNab: Mr. Irving

"That a Committee be named to consider the formation of a Canadian Engineer Reserve for active service, with authority to forward copies of the scheme read to all those connected with the Canadian Society of Civil Engineers, asking those willing to enroll themselves to send in their names, occupation, and place of residence. The list of such men to be sub-divided into districts and forwarded to the Militia Council for further action."

That motion was adopted and it was further resolved to gather information with regard to the proposal, and a Committee was formed. I do not know what that Committee has done. I have the honour to hold a commission in the Second Field Company of Canadian Engineers, and I think I may say on behalf of the Engineer Corps, that we feel the need of some action of this kind being taken by the Society. I would like to call the attention of the Committee, if it is still in existence, to a circular sent out by the Institution of Civil Engineers, Westminster, dated 1st September, 1908, with regard to a "special reserve of officers, Royal Engineers." The circular sets out the particulars of the formation of this reserve, the qualifications necessary, age limit, course of training, and so on. The Canadian Society of Civil Engineers has supplied the greater number of the officers of the Corps of Guides, but I think the Field Engineers are even more worthy of the attention of the Society, and I should like very much to see this Committee brought to life again and some action taken in the matter.

Mr. Chairman, I think we should all join heartily in doing something for our country; the only objection I have is that at my age I really cannot wear those little pantaloons. Mr. Coutlee

Before entering upon this discussion, I would move, seconded by Mr. Francis, that the Committees mentioned by the President be discontinued as Sub-Committees, and made Committees of the Society. Mr. Schwitzer

Carried.

Is there any further discussion on what Mr. Irving has brought up? The President

Major Maunsell — MAJOR G. S. MAUNSELL.—As a military engineer, I was rather surprised that the Society had not before taken this question up. Looking around the room I see many faces of civil engineers who have had a good training in military engineering; some graduates of the Military College, others who have taken McGill courses where they deal with military engineering, and others from Toronto University. No doubt, in case of war every one will do his best to defend his country, but why should not the Canadian Society of Civil Engineers cooperate with the military engineer in preparation for the defence of Canada? It is rather a pity that the Committee has done nothing The question is one that should not be lost sight of.

Mr. Leofred — Mr. Chairman, I think the previous speaker embraced military engineering because he liked it. I hope he will succeed in it as he has always succeeded, but as far as I am concerned, I prefer to follow civil engineering, rather than military engineering. I think that a great many engineers will feel as I do on this matter. Anyone is at liberty to take up military engineering who chooses; there are several schools for that purpose; but no one should interfere with those who want just to practice civil engineering and make their living. We respect the military engineers very much; we admire their success, and we think they are doing very useful work for the country at large, but we are doing our best in our own way, and I feel that we deserve to be left alone.

Mr. Leech — Mr. President, I do not know whether it is necessary for that Committee of which I was named a member to be continued from one Annual Meeting to another, but had I received a summons to duty on that Committee I should have been delighted. As somewhat of a military man—although I never had the privilege of smelling powder in earnest—I think it would be a fine idea for the members to give a certain amount of their ability in engineering to the education of the men who are to serve Canada in case of necessity. If that Committee is continued I shall be very pleased to do my share of the work in carrying it to a successful issue.

Mr. Freeland — MR. J. A. FREELAND.—May I ask whether the Committees wait for suggestions from others not on the Committee? The complaint is that the subjects allotted are so large they have not time to do anything. Do they expect the rank and file to make suggestions?

The President — Yes, I should think any Committee would be pleased to receive any suggestions.

Mr. Freeland — I should think that valuable suggestions might be obtained from the papers that are read before the different branches.

Mr. Coutlee — It must be remembered that this Committee work is a labour of love, performed after hours.

Mr. Leofred — I would ask whether in the formation of Committees the members are asked before their appointment whether they will be able to

devote any time to the work. If they are not consulted, it is no wonder that the work is often poor. Mr. Leofred

As a rule, Mr. Leofred, they are consulted, and if they are not able to do the work they usually resign, and most of the Committees have power to add to their number. The President

Mr. E. A. James.—May I ask if the Committee on Cement Specifications has reported, and if their report has been adopted. Mr. James

It is Mr. Jamieson's report. He will be here to-morrow, and I think we will leave that over until Thursday morning. The President

Mr. President, in connection with this Committee work, I would like to bring up again the question of whether it is advisable to make appropriations to the Committees in order that they may carry on their work. I have had some experience in other societies, and I know that it is difficult, if not impossible, to do effectual work without the sinews of war. A Committee should be in a position to spend a reasonable amount in the furtherance of its work. I would commend to the incoming Council the consideration of this matter. I think we could not spend the funds of the Society for a more useful purpose. Mr. Dion

There was a long discussion on this subject at the last Annual Meeting in Toronto, and the matter was left with the Council. If any Committee requires funds the Council has power to deal with the matter. So far no case has been brought up. The President

Perhaps the Committees are too shy. Mr. Dion

Oh, no, I should not think so. The President

The meeting then adjourned.

EVENING MEETING.

8.00 p.m.—A meeting in the form of a "Smoker" was held in the Council Chamber of the City Hall. There was a large attendance. The retiring President read his address, after which addresses were delivered by Messrs. C. E. W. Dodwell and M. J. Butler, C.M.G.

President's Address.

In closing my year as President of the Canadian Society of Civil Engineers, I desire to express my appreciation of the honour which has been conferred upon me, and of the personal consideration of the members. My interest in the welfare and future of the Society will always continue, and I shall be ready to add my efforts to those of the other members for its advancement. Mr. Mountain

Mr. Mountain

I am pleased to be able to report the continued growth of the Society, in the ranks of which are now included practically all the engineers of the Dominion in every branch of engineering. During the past year we have added two hundred and forty members and students to our rolls; so that we now have a total membership of two thousand five hundred and sixty-nine, of which the Honorary Members, Members, Associate Members, and Associates number fourteen hundred and five, and Students eleven hundred and sixty-four. This must be very gratifying to the members of the Society, and is of interest to the country at large, in that it shows a marked advance in all branches of engineering, which are so closely connected with the development of Canada.

The Canadian Society of Civil Engineers is an organization national in character, aim, and outlook, and is of recognized high standing. It must grow and increase in influence. The Society, as you are aware, some years ago formed itself into four sections: General, Electrical, Mechanical, and Mining. The object in view was to centralize the interests of the different departments of engineering and enhance the attractiveness of the meetings to those specially concerned in only one branch of the profession. While the home of the Society is established in Montreal, where practically all the business is transacted, the occasional change of place for the Annual Meeting has, in my opinion, served to join the men of the far east and the far west with their brothers of the great middle country. The formation of our local branches, which extend from the Pacific Ocean to the tide-waters of the Atlantic Ocean, while preventing decentralization, has done much to reconcile diversified views. The prime reason for the organized existence of the Society is to afford an opportunity for interchange of views on matters of interest to the members, thereby facilitating the advancement of engineering knowledge and benefitting not only themselves but also the community at large.

In order to give effective assistance in the advancement of engineering practice, it is important that we contribute to the work of our committees, so that their reports may be exhaustive and conclusive. It is not expected that these reports shall be final, as this would leave no room for improvement and further development. The reports should express the combined judgment of the members of the committees with regard to the practice which it desires the Society to approve, keeping always in mind the fact that such approval is subject to revision as circumstances justify.

Canada's great problem to-day is transportation. While the possibilities and even the necessities of water transportation in Canada are great, the problem will, I think, be largely solved by the network of steel which is being rapidly spread over the country.

We have without doubt entered upon one of the greatest years, if not the greatest, of railway development in our country. This is noticeable not only in regard to additional mileage, but particularly in the tremendous increase of motive power now being applied in the operation of railroads. Locomotives have been designed and put into use of a size that a few years ago would not be thought of, and, in addition to this, railway gradients have been reduced at enormous expenditure. These grade reductions are such that they have more than doubled the haulage capacity for a given engine. Mr. Mountain

In the development of water power, Canada, from one end of the country to the other, has made phenomenal strides. We constantly read of new water power construction and the resulting increase in the industrial development of the country. There has also been great progress made in the electrical transmission of energy from the centres of our water powers. Only a few years ago high tension transmission power lines were operating at a maximum of 30,000 volts, while this year the Hydro-Electric Commission of Ontario is constructing lines carrying 110,000 volts. In the application of electrical construction to railroads, the great improvement and added comfort in travelling is very noticeable, especially in tunnels, where trains are not now detained on account of gases generated by the coal-burning of the locomotives.

In the mining industries of the Dominion great strides have been made by the mining engineer, particularly in the construction and installation of machinery designed to handle in the most economical manner the riches beneath the soil. These new appliances have made it possible to develop properties which, in the days when only the pick and shovel were used, were without value, owing to the great cost of these old methods. Civil engineers engaged in municipal works have shown great advancement in the construction of waterworks, the proper disposal of sewage, and notably in the construction of roadbeds and pavements of all descriptions of highways.

In bridge engineering the problems which now face us are stupendous. Members of the Society are engaged in the building and construction of bridges with spans of 1,800 feet, in which also occur some most complex problems in substructure. The strength of bridges has been largely increased; in my own experience, almost threefold. It was said some two years ago that nearly everything had been discovered or invented except the flying machine and the North Pole. Since that statement was made the North Pole has been explored and flying machine construction rapidly advanced. I venture to predict that the progress of scientific engineering will in the next fifty years exceed that of the past fifty, great as that has been. Problems in engineering at which we now stand aghast

Mr. Mountain

will come to be matters of every-day practice. The members of the Canadian Society of Civil Engineers have undoubtedly lived up to the motto of the Society, whereby the great sources of power in Nature are converted, adapted, and applied to the use and convenience of man. The world owes more to the profession of engineering than to all the other professions combined.

I now wish to say a few words on the subject which, at the present time, is most interesting to me in my professional work. I refer to my connection with the Engineering Department of the Board of Railway Commissioners for Canada, of which I have the honour to be the chief. You are no doubt aware that the Board of Railway Commissioners was formed for the purpose of dealing with matters relating to railway construction, maintenance, operation, and traffic. The Engineering Department of the Board has to deal with construction and maintenance, and it is in regard thereto that I wish to speak specially. After a great deal of care and research, rules and regulations of the Board, specifying the proper method of presenting and filing plans, profiles, and details of all works in connection with railway matters, were drafted and approved. Plans of location of railways are now coming to the Board in great and apparently increasing volume from all parts of the Dominion. The Engineering Department, in examining these plans, has in view the following: That no infringement on other locations is allowed; that the proper location of railways over all streams has been observed; and that there is no interference with adequate drainage of the country. In connection with bridge work, the strain sheets are checked to see that they are in accordance with the standard specifications. After the plans of the bridges have been approved, the completed structures are inspected on the ground to see that the plans have been carried out.

All plans, which are forwarded to the Board with applications of railways for the crossing of highways, are examined to see if the crossing is a proper one, and to endeavour to obtain grade separation in order to carry the railway over or under the highway, as the case may be. In addition to the above, many cases are also submitted, both by railway companies and municipalities, for the purpose of safeguarding the public by the application of grade separation to these thoroughfares. Scores of highway crossings are examined monthly by the engineers of this Department, and voluminous reports are made on the subject of eliminating grade crossings. In the older parts of the country, railway development in some places has reached a stage at which, on account of the great number of intersecting lines, care must be exercised in order to make these railway crossings separate by means of overhead or subway construction. Such construction is, of course, not yet

possible in the prairie country of the west, where the ground does not lend itself to these conditions. Mr. Mountain

Great care is taken in the crossing of railways by high power electric transmission lines, in order to protect the public from dangers that might arise by breakage of these power lines. Such accidents are minimized by the construction of cables of reduced spans and greater tensile strength. The construction of all classes of conduits under the railway roadbeds for the conveyance of water, gas, and drainage is also a matter which demands close inspection. All plans of these are carefully looked into, so as not to impair the efficiency of the roadbed in the interests of the safety of the travelling public and trainmen.

The rules and regulations, after several minor amendments, have been thoroughly tested, and have apparently worked with equity to all whose cases have come before the Board for adjustment.

In closing my year of service in your cause, I desire to express my appreciation of the cordial assistance rendered by my colleagues on the Council and by your indefatigable Secretary. To this combined force I attribute whatever of success in advancing your interests has fallen to the year of my administration.

At the conclusion of the address Mr. John Kennedy took the chair, and on motion by Dr. Galbraith, seconded by Mr. C. E. W. Dodwell, a vote of thanks was accorded Mr. Mountain.

Mr. Mountain replied suitably, and the audience sang, "For He is a Jolly Good Fellow."

Mr. Dodwell spoke as follows:

I have no doubt that a considerable number of the members present have read or heard, the speech of Mr. Warburton, M.P., in the House of Commons, on the 17th instant, in regard to the reform and re-organization of the Engineering Service of the Federal Government. Mr. Dodwell

On that speech as a peg I propose to hang what I have to say on the subject this evening. So far as I am aware, Mr. Warburton is the first Member of Parliament that has ever taken up the cudgels in the House of Commons on behalf of the Engineering Service, and as he is a strenuous fighter, a great lover of fair play, and a man who always commands an attentive hearing, I believe that with the aid and sympathy of other favourably disposed members of Parliament, and with the active support of the Canadian Society of Civil Engineers, something will ultimately be accomplished.

I am convinced that no more important subject has ever engaged the attention of the Society since its organization in 1887, not merely because a considerable number of its Members are in the employ of the Provincial or Federal Governments, but because it is the proper

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function and the clear duty of the Society, by every legitimate means in its power, to advance the interests of its members in particular, and of the profession in general.

In a letter which I wrote about a year ago to a friend of mine in the Senate, at his own suggestion, I dealt with the matter somewhat exhaustively, and I shall save your time this evening and place the subject before you in a much clearer and more forcible manner, if I quote at some length from that letter. I said in part:

"More than once, in the past year or two, I have discussed with you the disabilities and anomalous position of the Engineering Service of the Federal Government, and it has occurred to me that in the interest that you appeared to take in the subject, I might find an excuse for writing you a letter, setting forth concisely the facts and arguments in favour of reform that I have expressed to you verbally.

"I do this in the hope that with your veteran knowledge and experience in Parliamentary procedure and conditions, you might be able at least to indicate the direction in which the efforts of Engineers in Government employ should be guided to the attainment of the objects they have in view.

"These objects in the order of (my conception of) their importance and desirability are,—

"First, a higher professional standard.

"Second, a recognized official status by enrollment in the Civil Service, and,

"Third, a system of pensions and superannuations.

"Let me discuss these objects seriatim.

"1st. *A Higher Professional Standard.*—The Engineering Services of the several Departments of the Federal Government have at present no recognized professional standard whatever, and the individual engineers in government service are certainly not, as they ought to be, conspicuous by their professional superiority over enginers who are not in government employ. When an engineer is appointed to a government post, he is not required to pass an examination, he is not asked to produce testimonials, diplomas, or credentials, he is not questioned as to where or how he acquired his professional knowledge and training, or whether he has ever had any education whatever, scientific, technical, or general. He is, or may be, at once put into a position of responsibility in which the judicious expenditure, or waste, of public money, depends upon his knowledge and experience as an engineer, and his judgment, integrity, and common sense, as a man.

"If the Engineering Service of the Government were properly constituted and organized, and a high standard of knowledge and experience made essential, it would be one of the most useful and profitable institutions of the country, and millions of public money would

be saved. In a young country like Canada, with an area equal to that of the United States, but with a population less than that of the city of London, with all the industrial capabilities and natural resources that go to make a country great, it is hard to overestimate the importance of the Civil Engineer in the national development. Mr. Dodwell

"I think I speak for the Society when I say that it believes that it would be in the public interest that no engineer should be appointed to the Government Service unless he is a member, in good standing, of the Society.

"2nd. *A Recognized Official Status by Enrollment in the Civil Service.*—When the Civil Service Act (48-49 Vict., Chap. 16), was passed in 1876, there were comparatively few engineers in any Department of the Federal Government, and they would appear, at that time, to have been regarded as fifth wheels to the coach, as more or less necessary evils temporarily employed, to carry out specific works, and to be discarded at the earliest possible moment.

"Either by design, or through a remarkable lack of foresight, on the part of the originators of the Act, no provision whatever was made in it for the incorporation in the Public Service of a corps of engineers in any Department of the Government, and the fact that at no time during the thirty-two years which have elapsed since the passage of the Act in question, has there been, so far as I am aware, any attempt to so amend it as to make it include civil engineers, would seem to indicate that their exclusion from its provisions was by design and intent. Be this as it may, it is surely nothing more than common sense, justice, and in the public interest, that civil engineers in the regular employ of the Government, and in receipt of yearly salaries, should have and enjoy all the rights, privileges and responsibilities, official status and security of tenure possessed by the various clerks and other officers, for whose ordering and behoof the Civil Service Act was passed.

"By this Act, the Service is divided into two classes:

"*Schedule A. Inside Service, i.e.*, Officers employed in Ottawa:

"(*a*) Deputy Head of Departments.

"(*b*) Officers who have special professional or technical qualifications.

"(*c*) Chief Clerks.

"(*d*) First Class Clerks.

"(*e*) Second Class Clerks.

"(*f*) Junior Second Class Clerks.

"*Schedule B. Outside Service, i.e.*, Subordinate Officers in Departments of Customs, Inland Revenue, and Post Office, employed outside Ottawa.

"Under class (*b*), *Schedule A*, it would appear that engineers attached to and employed in the Departmental Offices and Staffs at

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Ottawa, might, and should be, in the Civil Service; but, as a matter of fact, out of many engineers in the Public Works Department, resident in Ottawa, only two are in the Civil Service.

"*Schedule B* makes no provision for or mention of engineers, and, therefore, no engineers outside Ottawa, in whatever department, or of whatever rank, can be put on the Civil Service list. The Act provides minutely and exhaustively for the examination, appointment, promotion, salaries, and retiring allowances of clerks and officers of all kinds and grades, except engineers.

"To determine, however, where a civil servant stands, in regard to salary, increase of salary, or superannuation, an exhaustive study must be made of the following Acts:

"Chapter 7, R.S.C., an Act respecting the Civil Service of Canada, 1876.

"46 Vic., Ch. 18, R.S.C., an Act relating to the superannuation of persons employed in the Civil Service of Canada, 1886.

"56 Vic., Ch. 13, R.S.C., an Act respecting Government Civil Servants' insurance, 1893.

"60-61 Vic., Ch. 15, R.S.C., an Act further to amend the Civil Servants' Superannuation Act, 1897.

"61 Vic., Ch. 17, R.S.C., an Act to provide for the abolition of the Civil Servants' Superannuation Act and for the retirement of members of the Civil Service, 1898.

"33 Ed. VII, Ch. 9, R.S.C., an Act to amend the Civil Service Act, 1903.

"Ed. VII, Ch. 10, R.S.C., an Act to amend the Civil Service Superannuation Act, 1903.

"7-8 Ed. VII, Ch., an Act to amend the Civil Service Act, 1908.

"For my part I never could see the object of the discrimination made by the Civil Service Act of 1876, and perpetuated in every subsequent amendment, between the Inside Service and the Outside Service. Such division has always appeared to me as anomalous and uncalled for, creating unnecessary complications in the administration of the Government Service and doing an injustice to the majority of the employees of the Government throughout the Dominion. Surely a man is equally a servant of the Government whether he performs his duty in Cape Breton, Ottawa, or Vancouver Island, and it cannot be fair and reasonable, or in accordance with the most rudimentary principles of justice, or the eternal fitness of things, that a responsible officer of the Government in Halifax or Vancouver, with a salary of $2,000 or $3,000 a year, should be in a different and inferior position as regards status and tenure of office, to a junior third class clerk in Ottawa, with a salary of $200 or $300.

"It is my opinion, shared I may say, by abler and more prominent men than myself, with whom I have discussed the subject, that the whole of the Acts cited above, should be swept from our Statute

books and replaced by one comprehensive Act dealing exhaustively with every Department, abolishing the anomalous distinction between Outside Service and Inside Service, and bringing every permanent servant of the Government into one fold, one category, and one national and harmonious system. Mr. Dodwell

"In the Public Works Department there are now about one hundred engineers, of whom only three are on the civil list.

"Early last year, when a Commission was appointed by the Government to make a thorough investigation into and report upon the Civil Service, it was hoped by many interested persons, among them the Engineers of the P.W.D., that the fruit of the Commission's labours would be such reformatory legislation as I have indicated. When, a little later, it became known that an amendment to the Civil Service Act was to be introduced before Parliament at its last session, we thought that the fruit was already on the bough and that the millennium was at hand. The amendment was introduced and in due time became law. In it there is no mention whatever of engineers; it continues the thirty-two years old anomaly of sheep and goats, of an Inside and Outside Service, and the latter is relegated to even greater obscurity than before. It is, indeed, mentioned only twice in the whole Act, viz., in Section 3, where it is described as 'the rest of the Civil Service,' and in Clause 3, of Section 4, where it is provided that 'the Governor-in-Council may bring the outside service within its operation.'

"Peradventure you can suggest some means by which we can prevail upon the Governor-in-Council to bring about this devoutly-wished consummation, or, at any rate, to give us a hearing.

"Engineers in the Government Service, not being included even in the Outside Service, the Act would require radical amendment and extension before they could be beneficially affected.

"Under existing conditions there is no pension whatever for the widow or family of an engineer dying in Government Service, even though he may have been in it for the best part of his life.

"Section 43, of the new Act, provides that, 'If a person dies while in the Public Service after having been at least two years therein, an amount equal to two months of his salary shall be paid to his widow, or to such person as the Treasury Board determines.' But, it is not quite clear from the context, whether the words 'in the Public Service include persons not in the Civil Service, and to make the meaning quite clear, one way or the other, the words 'Public Service' should be changed to 'Civil Service,' or after them should be inserted the words, 'whether in the Civil Service or not.'

"In Sections 24 and 25 of the new Act, where the words, 'in the Public Service' also occur, it is obvious from the context that they include persons not in the Civil Service, and, therefore, in Section

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43, the benefit of the doubt or ambiguity would, no doubt, be given in favour of an engineer dying in Government employ, and his widow would be able at least to give him decent burial.

"There are a number of engineers in the Departments of Public Works and Railways and Canals, that have been in the respective Services for periods ranging from fifteen to forty years, men long past the prime of life, who have not been able either to save or invest enough out of their salaries, or to pay premiums on sufficiently large policies of life insurance to enable their widows to pass their declining years in comfort. To the question, Should not these widows have pensions? there is, of course, an answer, and, as far as it goes, it is a pretty good answer. An engineer enters the Government service presumably with his eyes open, and knowing well that if he dies in the Service his widow will get no pension. He must, therefore, be thrifty and himself provide a pension for his widow and family, by devoting a substantial part of his not too large salary to the payment of premiums on a good round life policy, or by putting aside what he can spare, or a little more than he can spare, in safe and profitable investments. But this presupposes a greater measure of thrift and prudence in the engineer than in other men, and it leaves out of account the fact that the widows of certain other employees of the Government would, and do enjoy, pensions after their bread-winners have been taken from them. In no phase of the whole question is there a better illustration of the anomaly and injustice of the exclusion of Government engineers from the Civil Service.

"In the matter of Superannuation, the Government engineers are in precisely the same position as they are in regard to pensions; even though they may have given their country faithful and efficient service for half their lives, they cannot look forward to any superannuation or retiring allowance, and their only resource is to die in harness before they are struck from the pay-list from incapacity due to age or infirmity, so as to secure for their widows and families the meagre allowance of two months' pay.

"I have said before that there are a number of engineers who have been in the Government service for fifteen to forty years, and the question is, what is to become of them? Those of longest service and most advanced years ought, of course, to be retired at not less than two-thirds their salaries, and younger and more energetic men put in their places; but for this there is no provision whatever, and they will drag along on the pay-sheet, the more onerous of their duties being performed by assistants, until some stony-hearted new broom in the Portfolio of Public Works—to use a somewhat mixed metaphor—throws them out on the scrap heap.

"But worse cases than these should be considered. Suppose a man,

in vigorous middle-age meets with an accident, either in discharge of his duties or not, or he is seized with blindness, or paralysis, or locomotor ataxia, or some other dire ailment which, without killing him outright, absolutely incapacitates him from all further work. What is to become of him? He cannot continue to draw his salary, because his place must be filled and his duties performed by another, and it is an axiom of Government service that two salaries cannot be paid for one duty. He cannot be superannuated, because there is no provision for it. If he had had the good luck to be killed outright, his family might have drawn two months' pay and given him a respectable funeral, but he continues to live and, what is worse, to be a burden of trouble and expense to his family in doctors, nurses, and hospital bills, and the softest hearted law on the Statute Book is powerless to help him. Mr. Dodwell

"In this case, as in that of the absence of pension for his widow, the engineer would have less ground, or even no ground, for complaint, if other employees of the Government, certainly not more useful, or of greater value to the public service, were not provided with superannuations at the close of their active careers. And it is not that the engineer begrudges the Civil Servant his pension, or would deprive him of it for the sake of establishing a uniformly ungenerous treatment throughout the public service, but it is the unjust, ungenerous, and, it appears to him, remedial adverse discrimination that ruffles and disturbs his ideas of the eternal fitness of things.

"With the details of either a pension or a superannuation system, I need not here attempt to deal further than to say that they present little difficulty. An accumulating annual deduction from an engineer's salary could be applied on ordinary actuarial principles to the purchase of an annuity for the engineer himself, on his retirement, or for his widow on his death. Such a system, if properly established and managed, would be automatic and self-supporting.

"Having now dealt separately with each of the three aspirations of the engineering service of the Government, let me, in conclusion, say a few words in regard to them collectively, because they are not distinct, separable, or independent.

"I have tried to show that it would be in the *public interest* if the standard of qualification for Government engineers were raised, that an engineering service of highest professional excellency is a matter of very great importance and would prove of vast practical value to the country. This may be illustrated in a crude and homely manner by supposing a great national work to be undertaken, as a means for the development of the country, such as a railway, canal, bridge, or harbour. The work, under thoroughly competent engineering design and supervision, ought to be well done for a million dollars. It is designed and superintended by the best that the Government service

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can produce, an engineer enjoying a salary of $3,000 or $4,000 a year. It takes four years to complete, and it is so badly designed and built that a second million has to be expended upon it before it can fulfil the object of its construction. If this hypothetical work had been designed and superintended by an engineer worth, and enjoying, a salary of say $10,000 a year, it would have been a success at the cost of the original million. The country has saved the difference between the $10,000 and the $4,000 engineer for four years, or $24,000, but to effect this has lost a million.

"This is, perhaps, a rough and homely illustration, but, I submit, a fair one, and many a parallel could be found in the engineering history of the country in the past twenty years.

"As an argument against a general increase of salary for Government engineers, I have heard the fallacy advanced that the whole question is covered by the eternal laws of supply and demand, that the Government would not be justified in paying higher salaries when as many engineers as are required could be employed at present rates of pay. To show the weakness of this line of reasoning, I have only to say that the Government could to-morrow replace every engineer in its service by a new set of men at half the salaries now paid—but, what sort of men would they be, and what sort of public works would they turn out?

"It is not a very far-fetched figure of speech to say that the cost of engineering works is inversely, and their value directly, in proportion to the salaries or rewards paid to their designers.

"As an object lesson of the value of an efficient engineering service in the development of a country, look at that of the Public Works Department of India, of which the achievements in the construction of roads, bridges, railways, and irrigation works, are not only the admiration of the world, but have been of incalculable value to the country and to the Empire. As a service it is unquestionably the best in the world. The competition for entry, the standards of qualifications, the educational training, and the salaries, pensions, and superannuations, etc., being all on a commensurate and magnificent scale. So far from there being any reasons why Canada should not have an equally good engineering service, the fact of ours being a larger and better country, offers many cogent and obvious reasons why we should have, and some day will have, an even better.

"The obvious way to secure a higher professional standard and a more efficient engineering service is to make the service better worth entering—and, a mere corollary—more difficult of entry. The simple and direct way to accomplish this is to increase the rewards:

"(*a*) By giving the engineers a recognized official status as members of the Civil Service.

"(*b*) By establishing a system of pensions and superannuations. Mr. Dodwell

"This is the case for the engineers set forth in a very imperfect way, but making up in sincerity what it lacks in vigour and perspicacity. I cannot, and do not, claim that our motives and aspirations are purely disinterested, but I do maintain that the consummation of our desires would be vastly in the public interest, and redound to the great advantage and the development of (potentially, at least) the finest country on the footstool.

"It is our earnest desire to bring this matter before the Government in some regular and proper manner, and if you can aid us in any suggestion to this end, you have our profound gratitude."

Now, Mr. President and gentlemen, I have no intention of taking up more of your time, further than to say that what I suggest is that a strong Committee of the Society be appointed to draft a memorial, petition, or memorandum, setting forth in a clear and definite statement exactly what the Society wishes and believes capable of accomplishment in the establishment of an engineering service on lines parallel to those of India and Australia.

I shall, therefore, in the business session, to-morrow morning, move (*a*) that the President do appoint a Committee for that purpose, and (*b*) that the Secretary be authorized to reprint for distribution to corporate members of the Society the speech of Mr. A. B. Warburton, M.P., and the reply thereto of the Hon. Dr. Pugsley, Minister of Public Works, provided that we cannot obtain a sufficient number of copies of the Hansard of the day.

Mr. M. J. Butler.—The subject I have selected is the status of Mr. Butler the engineer in Canada, why he is regarded as he is, and why he is not regarded as he ought to be.

In the development of the country, in a time like the present, civil engineers are the most important factors in modern civilization. Nearly every important industry and transportation interest in Canada is represented in this room to-night. The attention which this meeting will receive at the hands of the Press to-morrow, will be a gauge of the public interest in the work going on. Needless to say, if this were a political gathering, there would be two or three reporters present, and all that transpired would be set out at full length for the benefit of the community. It will surprise me very much, however, if more than a few lines are devoted to recording the fact that the Civil Engineers held an open meeting at which matters of public importance were under discussion. Now, why is this the case? Why is it that the general public have so little interest in the doings of a profession that touches so closely upon all of the matters which have so much to do with modern life? Perhaps an answer may be found in the fact that the engineer himself is at fault. He discusses questions from such a purely and exclusively

Mr. Butler

technical standpoint that the layman cannot follow. This is not so with law or with medicine.

The engineering profession is an all-absorbing one. The purely technical problems are so fascinating that the engineer finds it amply sufficient for all his best endeavours, and, consequently, he does not attempt to devote any portion of his time to any other matter than a solution of the particular technical question which he has before him. There can be no doubt that the profession of law requires as much learning, but owing to its peculiar nature—touching as it does all the human relationships—a lawyer is the adviser of the community, and, naturally, seeks politics as an outlet, becomes a law-maker, and is, therefore, well known to the whole community. In like manner, the doctor when any question of hygiene arises, becomes a public servant for the time being, talks so that the layman understands him, and points out the great advantages to accrue if certain hygienic measures, which he recommends, are adopted. Now it may be possible that the questions to be dealt with are sewerage or water supply—problems that will necessarily have to be solved by the engineer—but he will never be heard of in connection with the public aspect of the question. Hence, the remedy would seem to be, that the engineer who takes so important a part in the carrying out of works ought to go a little farther and let the public know something about what he is doing. I think I have shown that he is altogether too liable to let the scientific aspect of the question take up his whole time to the exclusion of the practical. It is not an infrequent condition to have a large question referred to an engineer or a board of engineers. It may be a mixed question of engineering, finance, and general business administration. The rule has been, for the engineers—as soon as they have reached the critical stage demanding a decision as to whether or not the thing should be done, to pass this phase of it by with the remark "this belongs to the financier or lawyer." From the engineer's training and experience, he ought to be the best adviser on these very questions. I think that, in a measure, these conditions explain why the general community is not able to get on intimate terms of acquaintance with the profession. The consequence is that business men, who realize that they require the services of an engineer, look upon him as a staker-out or a man to put upon paper the ideas which he has originated; and then they obtain the services of a practical man, so-called, to construct the work.

An idea has grown up in the public mind, and also perhaps, in the profession, that there is a great difference between the man of theory and the practical man. There is reason, perhaps, for this. A young man, sometimes fresh from college, with a smattering of engineering-pseudo-scientific knowledge—but without any faculty of

application of the book work which he has read but has not assimilated, undertaking to carry on works, throws discredit on the profession. There can be no distinction between theory and practice. A good theory must necessarily be based upon practical experience; failing which, it is merely a tentative hypothesis, which may or may not be true. Mr. Butler

Truly, a civil engineer should be practical as well as scientific, and those of the profession who find their working field in this Canada of ours, should be among the best in the world. Our country occupies a peculiar geographical position. If one will carry the map of Canada in his mind and endeavour to study out the transportation problems involved, from the standpoint of maximum economy alone, it will be found that the Maritime Provinces should find their market in the New England States. The rich and fertile sections are separated from similar regions in Quebec by a long distance across an unprofitable region. Between Quebec and Ontario there is, of course, a direct connection of rich and prosperous districts. Again, however, there is a barren region of practically a thousand miles between Ontario and the North West provinces. Hence, the transportation of the products of the West to the East, and of manufactures from the East to the West, require for their solution the most economical methods possible; all of which will call for a higher degree of skill on the part of the engineer in Canada than that of any other country. And, if we fail to do our part in this regard, the political future of the country will be imperilled. It is essential that the transportation problems of Canada be worked out on East and West lines, and of North and South. I take it that, in the end, economic laws will govern even political situations; and while we have sought to work out for ourselves on this northern half of the continent, an ideal democracy under the sovereignty of the British Empire, if it is to be a success, such success must come from the solution of the problems which I have indicated. Over and over again we find that engineers are lacking in that business acumen which is a part and parcel of the equipment of a man who needs must carry on the industry of the country. The engineer can readily and easily remedy this defect; and if he does, he will then be prepared to take his part in helping to make this Canada of ours what nature intended it should be—one of the greatest countries of the world. The late Mr. A. M. Wellington well said that "the test of a good engineer is the man who can do for one dollar what almost any person might do at some price."

26TH JANUARY, 1910.

The morning and afternoon were devoted to visiting the following works and places of interest, under the guidance of a Committee of Ottawa Members:

The Ottawa Electric Power House,
Mr. J. R. Booth's Mills,
The E. B. Eddy Co. Mills,
The City Water Works,
The Chaudiere Dam,
The Dominion Archives,
The Royal Mint,
The Observatory,
The Edinburgh Mills.

In the evening the Annual Dinner of the Society was held in the Russell House, and was attended by 163 members and guests of the Society.

MORNING SESSION.

JANUARY 27TH.

The President — The first business this morning in accordance with our programme, is the reports of Committees. There remains the report of the Committee on Standard Methods of Testing and Specifications for Portland Cement. Mr. J. A. Jamieson is chairman of that Committee, and I will ask him to assist me.

Moved by Mr. J. E. Schwitzer, seconded by Mr. C. R. Coutlee, that the report be received.

Mr. Jamieson — Mr. President and Members, at the last Annual Meeting, the Committee on Standard Methods of Testing and Specifications for Portland Cement, presented a specification and rules for testing. No doubt during the year many members will have had opportunities of testing under this system. The Committee thought it well that the Society should have its own specifications so that members in specifying for their work could simply refer to these. While, perhaps, the system of testing recommended is not an ideal one, yet we have to bear in mind that it must be on a commercial basis, with a view of getting as reliable a cement as possible. During the past year we have had communications from different members, calling attention to various points, but we did not, as a Committee, consider that we could make any material change from what we presented last year, although as greater knowledge is gained of the

chemistry of cement we may have to change and improve our specifications from time to time. It was with that in view that last year the Society made the Committee a permanent one. We have had no small task in endeavouring to meet the views of everyone, and we have accumulated a good deal of information, so that if any of the members wish to ask any questions I will try to answer them, and make it clear why we framed our rules on certain lines with the view of detecting unreliable cement. I should like the Society to adopt the proposed rules and specifications and make them as official as possible, so that the members will use them. One other point I might touch on is the question of the standard package for Portland cement. To-day there are no standards, but I think the time is ripe for adopting one. Since we buy by weight we consider, on the whole, that the hundred pound bag, or a barrel of 400 pounds, is the best standard to adopt. A Committee of the manufacturers of Portland cement, with whom we conferred last year, agreed with us on most points. They pointed out that the hundred pound package would involve new bags, and, therefore, would require to be adopted gradually, but larger manufacturers were in favour of making a standard package of one hundred pounds if they were given time to change their bags and use up their existing stock. The merger of the cement companies makes the present time opportune for following up this question. If the meeting will make a recommendation with that end in view, the Committee will take up the matter with the cement companies and try to obtain their co-operation towards arriving at the desired condition. Mr. Jamieson

The report of the Committee has not been in the hands of the members long enough to enable them to intelligently discuss it. Mr. Leofred

This is last year's report, and the members have had one year to consider the subject. The President

I withdraw the objection. Mr. Leofred

Mr. President, may I ask whether the Committee has given attention to the quality of sand necessary in the mixing of cement for mortar. Good cement is often more or less spoiled by carelessness in use of sand, especially in municipal works; for the sake of a very small saving in the cost of the sand, they will practically ruin what was originally good cement, in the use of it. Has this side of the question been considered by the Committee ? Dr. Dawson

We have not gone into the question of sand in detail or prepared any report on that subject. We recognize that the question of sand is next in importance perhaps to the cement itself. The very best cement can be deteriorated by making concrete with inferior sand. That is a subject we have in view, although we are not specially charged with it at the present time. Mr. Jamieson

Dr. Dawson — In preparing standard specifications might it not be well to include some recommendations as to the quality of sand, and the necessity for what one might call cleanliness in washing the stone for mixing the concrete, so that good cement need not be spoiled by dirt, such as street mud, which is often mixed with the concrete.

Mr. Dodwell — This is a matter quite outside the scope of the duties of the Committee, of which I am a member. I think our investigations should be strictly confined to cement. Let the user do what he likes with it, mix it with mud if he wants to. Cement is cement, and good cement will be good if it is properly used. The handling of the sand or stone has nothing whatever to do with this. If we limit ourselves to cement we shall have plenty to do. If we go into the question of mortar, sand, and so on, we will lose ourselves in a mass of work that we were not intended to undertake at all.

The President — I think the objection is well taken. The Committee should not extend its labours too widely; yet it might be well to recommend the quality of sand to be used with this cement.

Mr. Jamieson — The question of sand in concrete is really another large subject that should be dealt with separately. We recognize the importance if it, but we do not think we are charged with it.

Dr. Dawson — May I ask one further question ? Are you making any tests with any mixtures of cement and sand for experimental purposes or information ? Does that come within your scope ?

Mr. Jamieson — Yes, I think so, and we are doing that.

Dr. Dawson — If you are experimenting with tests of cement and sand, surely it might come within the scope of your researches to say what kind of sand is best, and what the effect of impure earthy sand is.

The President — I think sand comes within this scope; I would not go as far as to say that gravel does.

Mr McColl — Mr. President, I think the great trouble with our Committee work is having subjects covering too much ground, but the idea of a standard package is an excellent one. I would like to ask whether the Committee has considered the suitability of this specification for cement used in sea water.

Mr. Jamieson — We have accumulated a considerable amount of data on the suitability of concrete for structures in sea water, but we have not made any recommendation nor have we considered that question very fully.

Mr. Coutlee — Could you embody the data you have already got ? There were some experiments made in Boston harbour; could those be formulated by the Committee and given to the Society ?

Mr. Jamieson — It might be easy to give a reference to the authorities and different tests of data, but it would be a pretty large undertaking to print them; that is to bring them all into pamphlet form. I might say in reply to Mr. McColl that there is a large amount of evidence now

on record going to show that if concrete is well made there is no material difficulty about using it in sea-water. It is due to the porosity of the usual concrete that disintegration in many cases has taken place. That is, the sea-water percolates through the porous concrete and the magnesia contained in sea-water causes more or less reaction on some of the constituents of the cement; also there is freezing and thawing between high and low tide, and that is where the greatest trouble has been caused. I think the greater amount of disintegration is due to the porosity and the freezing. Mr. Jamieson

Then as far as your investigation has gone it is to the effect that a cement that would be good in fresh water would be equally suitable for sea-water. From the experience I have had, I have come to about the same conclusion. In the Bay of Fundy we have a difference of forty feet between high and low water, but as far as my experience has gone, the difficulties have been largely due to concrete not being properly put in. You can understand that with forty feet of tide changing every six hours it is difficult to get the concrete set before the tide comes up. It has been suggested that we needed a different class of cement. As far as I understand, from what has come before you, it has led you to believe that the same cement is suitable, and there is no failure from chemical action. Mr. McColl

It is difficult to answer definitely because there are chemical reactions that the experts seem scarcely capable of giving an opinion on as yet. It would appear that you need cement very low in magnesia and containing as little free lime as possible. It is certainly preferable to have the cement set in the way of blocks instead of depositing it in a semi-fluid state and allowing it to harden. Possibly it should be made more dense in form and set in place. If deposited in sea-water under ordinary conditions, with the rising and falling of the tide, it is liable to cause trouble and disturbance in the mass. Mr. Jamieson

It seems to me, Mr. President, if the Committee is not in a position to make a separate specification—or does not think it necessary—for cement to be used in sea-water, it would be of much practical value if some memorandum of present knowledge were published for the guidance of engineers who have to use cement in salt water. I understand that the Committee has conferred with the manufacturers, and that this report is practically the result of that conference. Is that correct ? Mr. J. Kennedy

That is correct, Mr. Kennedy. That is, the manufacturers concurred in our specification at a joint meeting. In some respects they thought we were a little hard on them, but they eventually agreed that cement could be commercially manufactured under these specifications. Mr. Jamieson

Has the Committee any data on the use of iron ore cement ? In Germany "Erz" cement, as it is called, is claimed to withstand sea- Mr. Armstrong

Mr. Armstrong water better than ordinary Portland cement. I think iron ore is substituted for clay in the manufacture.

Mr. Jamieson There is a cement manufactured in Germany for which large claims have been made in the way of superiority for sea-water work, in which they use oxide of iron and reduce the aluminium, that is, using a silica containing less alumina and using the iron as a flux. Really if we come down to the basis of the manufacture of cement, we can manufacture the finest cement out of pure oxide of lime and silica. Those are the two ingredients, but it is almost impossible to manufacture such a cement; at least commercially, on account of the very high temperature at which it has to be burned to get a fusion, and therefore, some flux in the way of iron or alumina must be introduced. Whether the particular cement referred to has any greater advantage over the other I am not able to say, beyond the claims and recommendations of those who have tested it. It has only been manufactured within the last few years, and it has not yet been used. In reply to Mr. Kennedy's suggestion that the information the Committee has should be put out in a form useful to the members as a whole, if it is the feeling of the meeting that they should like that done, I think the Committee would be pleased to undertake it, although it involves considerable work. As we have not means for making any very extensive tests, we might in that supplementary report give a reference to the articles and data on the subject so that the members could look it up.

Mr. Coutlee Being a permanent Committee, could you issue bulletins ?

Mr. Jamieson Yes. In the same way as we issue our report through the Council. We would be glad to do that, but we do not want to undertake too much detail work.

The President It could be issued in bulletin form. If you will look at page 65 of this report you will see that in cement testing they allow a standard sand. I think the suggestion of Mr. Dawson is a good one, and that if it is not asking too much, this Committee should take up the question of sand. We cannot have another Committee on sand. We have several Committees working now and two or three more to be added. The Cement Committee is a standing Committee and may very well deal with the question of sand.

Col. Ruttan On page 62 there is a specification for standard sand for testing purposes. The sand suggested is the sand used by the American Society of Civil Engineers. It is a very good sand.

Dr. Dawson The point I wished to bring forward for discussion was whether inferior earthy sand had not a very detrimental effect upon cement. Warning might be given against allowing the use of muddy or earthy sand.

Mr. Kelley While I believe that an examination in detail of various sands would be valuable, I also believe that if this Committee takes

up the question, they will drop cement and study sand. It is a subject they cannot cover in a year. Some years ago it devolved upon me to take up that very study. The longer I continued at it the less I found I knew. The experiments were conducted over months, not days. I took the standard crushed quartz, common commercial sands, sands of varying sizes and grains, and I had a sand composed of pure quartz, the grains of which under the microscope were as round as fish eggs, and as polished as the glass agates with which boys play marbles. I found that the round grained sand of varying sizes gave better results than the crushed quartz with the same cement. I found that common sand graded through sieves in different sizes, if graded one way would give one result, and if graded another way would give another result. I looked up all the specifications for sand that I could find, and they all recited that the sand must be clean and sharp. After that series of experiments I took the word sharp out of my specifications, because the very best results I secured were with this round, polished sand with grains of various sizes. Yet if I were to find a sand to-day that was round and polished, I would make a long series of experiments before I would use it. The result of this year of work forced upon me the conclusion that the sand did not require to be sharp, but that it did require to be in grains of varying size. A sand of a uniform size gave poor results. A sand running from small to good large grains gave excellent results. Another astonishing result was that one sand pit with clay in it gave better results than the same sand when washed and clean. Mr. Kelley

It was not one experiment, but a series of experiments that produced these results, and that is the reason why I say that when I got through that year's work I felt that I knew less about sand than I had ever known before, and I think so yet. I believe if this Committee will confine its attention to cement and the accepted method of testing with an artificially produced crushed quartz, which is called the standard sand, that it will have its work cut out for this year.

Mr. Chairman, some few years ago I carried out some experiments in connection with a work at St. Catharines somewhat on the lines spoken of by Mr. Kelley. I did not have the polished smooth quartz sand, but I tried the standard sand and various sands from the district, carrying on the experiments for some months. The results were so conflicting that it was impossible to analyze them, further than to demonstrate that pit sand containing a small proportion of clay gave the best results. It was better than the standard sharp sand. Mr. Leonard

May I ask Mr. Kelley if he used a sand made from crushed granite, and if the results differed from the other ? Mr. Bishop

Mr. Kelley

One sand was artificially crushed granite. As I recollect at this time it gave results commensurate with the standard sand. It was artificial sand, made for testing and not the clean white standard sand that we get to-day, known as the Ottawa Standard Sand.

Mr. Francis

Mr. President, I have made a number of tests in this connection, and I think the only conclusion to come to is that standard sand used in cement tests can only be regarded as of service in the way of comparison. I agree with what Mr. Kelley and Mr. Leonard have said, that it is almost impossible to tell how a pit sand is going to act in mortar, and there is no doubt that the grading of the sand has a far greater effect than any other property of it. I think it is absolutely necessary to consider very carefully any sand offered for use, and, if possible, make tests before any important concrete work is done with it.

Mr. J. Kennedy

If I may be allowed another word, I think we are discussing two subjects. The cement matter is quite separate. I agree with Mr. Dodwell that the question of cement is separate from that of sand, and that a good specification for cement, tested with a standard sand, deals with that point. The sand matter, as we all know, is just about as important as the cement. I have had no such extended experience as Mr. Kelley, but I had something to do with sand a while ago and got different sands, one from the Saguenay, one from the Ottawa, one from near Montreal, and another from New York. The Saguenay sand was nearly useless. With the New York sand we could make a mortar that had twice the strength of that made from the Ottawa sand. The Chateauguay sand came in somewhere between. If the Committee can take up the question of sand as another question, it would be of tremendous value, but whether that could be done without an appropriation of funds I do not know. Perhaps some arrangement could be made with McGill or somewhere else to do some investigating. It is quite as important as the cement, but another subject.

Mr. Jamieson

I am not sure to what extent we could undertake such an investigation. So far we have made tests and experiments ourselves, and we have also called upon the different testing laboratories to aid us in certain specified tests. They did this without charge, but we cannot call upon them to do too much. Much more cannot be done unless special provision is made therefor. I was particularly pleased to hear Mr. Kelley's experience with sand, and I thoroughly concur in his views. No special importance should be attached to the sharpness of sand, other conditions being right. The movement that has caused the polishing and rounding of the sand grains has removed all the inferior particles of the sand. That holds good also as to round gravel, which we find equally good and sometimes better than crushed

stone. The reason is that in crushed stone we often have loose particles adhering to the stone, behind which the cement cannot penetrate and adhere to the solid part of the stone. It is more important to have a sand that will grade from fine—not too fine—up to fairly coarse, than it is to have it all of one size, because then there are too many voids to be filled by the cement. We realize the importance of the sand question, but as Mr. Kelley has shown, it is a large question to go into. Mr. Jamieson

Has anything been done to show how many pounds of cement equal a cubic foot, and whether the Committee have any specification as to the volume of cement to the barrel? Mr. Bishop

One hundred pounds of cement we consider one cubic foot. Loose cement will only weigh eighty pounds to the cubic foot, and a thoroughly packed cubic foot will weigh something over one hundred and twenty pounds; so that a cement fairly packed will run approximately one hundred pounds to the cubic foot. Mr. Jamieson

Mr. President, I understood Mr. Jamieson to speak rather disparagingly of the use of very fine sand in making mortar. That reminds me that a few years ago there was a cement manufacturer in Montreal who turned out a silica cement, which, I understand, was a mixture of silica sand with cement, and the whole of it then ground very finely. I never made any exhaustive tests of that cement, but perhaps the Committee have done so, and can give some definite information regarding the use of very finely powdered silica cement. The tests made at St. Catharines included some tests with sand which is practically dust, from the shore of Lake Ontario, near Port Dalhousie. I used that alone with cement and also mixed with pit sand. I am sorry I have not those records, but the results were so confusing that it was almost impossible to analyze them. My impression is that the use of very fine sand with pit sand gave a good result when intimately mixed. Mr. Leonard

Mr. President, in regard to this matter of testing the value of sands for use as cement, I feel quite sure that arrangements can be made with McGill University to conduct such work as the Committee may care to supervise. The Secretary

The so-called silica cement consisted of Portland cement 1 part, and silica sand 1 part, ground together. The thorough grinding of the two materials together made an excellent cement. It gave very good results, and it has to-day many things in its favour, particularly in view of the fact that all our cements are burned through the rotary kiln. Rotary kiln cement is naturally very quick setting; almost as quick in its natural state as plaster of paris. The result is that all manufacturers must add another material to their cement to retard the setting, which you will notice we hold down to a certain limit. If we had a mixture of inert material that would reduce the Mr. Jamieson

Mr. Jamieson time of setting it would perhaps be of value. That is a matter to which we have given some consideration, but I do not change my opinion one iota in regard to such fine sand, as Mr. Leonard has mentioned. I have had experience with what is called "blow sand." Concrete made from that sand has not, on the average, half the strength of concrete made from good coarse grained sand. It is practically quick sand, which is only a very fine silica. It is important to avoid such sand as that in construction, although a small amount of it mixed in with good sand would be all right. That is, there are voids between the grains of sand, just as there are between the stones, which should be filled if we are to get a dense concrete. If the materials are graduated so as to completely fill all voids better results will be obtained.

Col. Anderson I move the adoption of the report, and I should like to add a rider that the Committee be instructed to negotiate with McGill, as suggested by Professor McLeod, with the object of continuing the tests in the direction of making a special report on the effects of different sands on the constitution of concrete. I remember some years ago, when I was in England, in Somersetshire, I saw a man adopting a rather unusual procedure in mixing mortar for a building. He was gathering the mud off the street and putting it into his trough with the lime. I asked him, "What are you making that mortar with ?" and he said, "Us mixes it aw wi' mook." Translated he meant that he mixed it with muck. I learned that it is a constant practice in the South of England to make their lime mortar with ordinary mud off the field or street. That would seem to argue in favour of what Mr. Kelley said, that a little admixture of mud with the sand is no detriment to the strength of the mixture. I may say that in my own practice I have found that if the granulation of the sand was diverse, ranging from fine to very coarse, it was safe to ignore the presence in the sand of a small amount of vegetable matter, or mud of one kind or another.

Mr. Jamieson I think we should be careful on that point. While a good many tests have shown pretty conclusively that a small percentage of clay will increase the strength of concrete made with it, we must be very careful not to exceed that small percentage. I think it is safer to keep everything clean. Our results are good enough with clean material. In the country, where it is difficult to get absolutely clean sand, but where sand with a small amount of clay in it may be obtained easily, such a practice would be permissible. Then the saving of cost is also a matter for consideration. You cannot throw anything into cement and obtain good concrete. Vegetable matter particularly is objectionable. A small amount of clean clay would not be an injury, but we should be careful on that point.

Col. Anderson What I meant was that traces of such material would do no harm.

In seconding the motion, I would like to suggest that the Committee consider the effect of sea-water in its next report. Mr McColl

The motion was then put and carried.

Does the adoption of the report mean that this becomes the standard specification of the Society? Mr. J. Kennedy

I think so. It is adopted at an Annual Meeting of the Society and becomes the specification of the Canadian Society of Civil Engineers for standard cement. The President

I would like to hear from Mr. Kelley concerning packages. This is a good time to advance that matter. Mr. Jamieson

I think that an essential part of the specification. It is included in the specification of the Joint Committee, composed of members of the American Society of Civil Engineers, the Maintenance of Way Association, the American Society for Testing Materials, and the Cement Manufacturers' Association. In that, a standard package is accepted and included in the specifications; practically one hundred pounds to the package. There is a tare allowed on account of the sack. As the Chairman of the Committee has remarked, it is difficult to say what a cubic foot of cement will actually weigh. The variation in specific gravity makes a difference which has to be allowed for, but the package must not weigh less than a certain amount. I think that suggestion should be incorporated. Mr. Kelley

The next business is consideration of Mr. Dodwell's address on the standing of Government engineers. Perhaps Mr. Dodwell has a formal resolution. The President

I went into the matter pretty thoroughly, and I think I had better leave well enough alone. I shall be very glad to have the approval of the meeting, or a discussion by members. Mr. Dodwell

Mr. Chairman, I am sorry that a larger number of the members have not had time to study this very important question, probably one of the most important that has been brought before the Society. I feel that this Society is a great body, reaching through the Dominion, and anything that benefits one part of that body must be of benefit to the whole. If this Society can influence the Government to justly increase the salaries of Government Engineers, every engineer in Canada would benefit by it. Employees of the railroads, who are now receiving a salary of $1,800 or $2,000, should be paid double that amount. I think it would be well to have a strong Committee interview Sir Wilfrid Laurier, the Hon. Mr. Pugsley, the Hon. Mr. Graham, and the Hon. Mr. Brodeur, in order to explain the condition of the civil engineer in Canada. I hope that many of the members present will join in this discussion. Mr. Leonard

I move that the President name a Committee to draft a memorial or petition to bring before the Premier for discussion. If the Com- Mr. Dodwell

Mr. Dodwell mittee receives any encouragement—as I believe it will—the next thing will be to draft a series of regulations, or a chapter to be added to the Civil Service Act, or an entirely new act. We can get the blue books, covering the constitution, recruiting, and regulations of the Engineering Service of India and Australia, and it is upon those lines that I think we ought to work. I think, also, that Mr. Warburton's speech in the House in connection with this matter, together with the reply of the Hon. Mr. Pugsley, Minister of Public Works, should be distributed amongst our members. My motion is that the President be asked to name a Committee, and that the Council be authorized to have Mr. Warburton's speech, and the Hon. Mr. Pugsley's reply printed and circulated.

Mr. J. Kennedy Can we not get enough copies of Hansard to send around without having these speeches specially printed ?

Mr. Jamieson Mr. Chairman, I regret that I was not present to hear Mr. Dodwell the other evening. While I know generally the scope of his address I have not particular information. This is not purely a matter of the Government engineers. As it stands the resolution is merely to memorialize the Premier with regard to the Government engineers. If we are to raise the status of the engineer, it should be as a profession and not in the Government service alone. The corporations employ the larger number of engineers.

Mr. Dodwell I do not understand how we can ask the Government to raise the standard of the profession all over the country. If the Government establishes a proper engineering service similar to those of the two great dependencies I have mentioned, that would raise the standard of the whole profession. I am in favour, in the strongest possible way, of the elevation of the standard of the profession, and I think this is a very practical way to go about it. It is for the Society itself to raise the standard of the profession throughout Canada; the Government cannot do it, but the Government can establish its own engineering service on a high standard, and that will cause the different colleges and engineering schools to make their standard of teaching and qualification commensurate with the requirements of the Government service. The Canadian Society of Civil Engineers now sets the standard of engineers in this country. It is for the Government to take advantage of that standard and organize a reformed and improved engineering service. This can, I think, only be done on the lines I have suggested.

Dr. Galbraith It will be important, Mr. President, for the Committee to study the status of the Government engineer in India and Australia, as has been suggested, and also in the United States and other countries where the Government engineer is already at a high standard. This Committee cannot go to the Government with mere generalities; it must have facts, statistics showing what is done

in other countries. There may be exception taken to engineers trying to raise their pay. Such a proposal from any one is always open to unpleasant suggestions from others. We must avoid that. The Committee should get all the statistics possible, work up the case fully, and present a good argument, altogether free from what might be called selfish reasons. Dr. Galbraith

I do not know whether this resolution has been seconded yet. I think it should include more than has been mentioned. We must consider, on our part, if improved services cannot be given for increased salaries. We now number some twenty-seven hundred members in the Society; roughly speaking, half of those are Students and Associates. There must be some twelve or thirteen hundred practising engineers. Mr. J. Kennedy

Thirteen hundred and fifty Corporate Members and probably as many as 2,000 practising engineers. The Secretary

At a moderate estimate it requires the expenditure of a hundred and fifty million dollars per annum on engineering works to keep us all employed, and give us a moderate remuneration. What return can we give ? Railway companies, power companies, manufacturing companies, and other semi-private or private concerns may be left to arrange for their own engineering services, but as regards the Government service we should, I think, make some recommendation tending towards the improvement of the system. I do not speak of the personnel, but of the system. The different departments which do engineering work, have their separate staffs spread over the whole Dominion, entirely overlapping each other as to territory, and irregularly divided as to character of works, navigable channel improvements, for instance, in adjacent localities being carried on by three different departments, and canal work by two. It is obviously impossible that under such methods there can be the highest engineering efficiency, that the Government engineering can be co-ordinated as it should be, and that experts be placed where their services will be most valuable. The Government now spends many millions per annum upon engineering works, and it is of great importance that work should be designed and executed under the highest engineering skill, and under a homeogenous system. This is not the time or place to say definitely what organization should be made or how the obvious difficulties of breaking up the present heterogeneous systems and the organizing of something better may best be carried out, but it is safe to say that the engineering works of the Government should be carried out under one engineering corps modelled somewhat after that of the British East Indian Engineering service, referred to by Mr. Dodwell, or the United States Engineering service. An essential point is that when any great work is undertaken, the proper design and execution of which is a Mr. J. Kennedy

Mr. J. Kennedy

matter of national importance, it should not depend upon the judgment of any one man, however able, still less on the judgment of the engineer of the department who may happen to be in the department or in the locality of the work, but on the judgment of a board of experts chosen out of the whole Government staff, or partly from its staff and partly from eminent engineers outside of it. A consulting council should be held who would deal broadly with all the questions involved. The United States Government system, for example, is very good. All Government engineering works are carried out under the supervision of the United States Army Engineer Corps, who are civil as well as military engineers. When a project of importance is developed a board is at once called to consider it. The engineer officer of the district is ordinarily the chairman of that board. The other members are selected from members of the corps who already are experts upon the questions involved or have the capacity to become experts. This board thoroughly considers the project in all its bearings. If it is found to be sound, it receives the endorsation of the board; the designer is relieved of responsibility, and the Government can proceed with confidence. If, on the other hand, mistakes are found in the design they are corrected by the board, and the design in that way made good before being made public. The evils of alterations and consequent increased cost during construction are thus in great measure avoided. Better work in execution is also secured, because the humblest engineer in the service can rely upon advice and support while right, and be subject to condemnation only when wrong. The details of the system would need careful consideration, but the essentials to be attained are a highly skilled, well organized body of Government engineers appointed, promoted, and paid for professional ability, not by favour, and not subject to control by contractors and politicians. Under some such system greatly better engineering service could be rendered to the country, and better remuneration be deserved. In considering the whole question of status and remuneration we must bear in mind that competition amongst ourselves is somewhat keen, and likely to be more so. Engineers are being trained at home and pouring in from abroad at an astonishing rate, and we cannot expect the long continuance of the expenditure or capital for engineering works which is required to keep us all going. The field is, however, spreading rapidly, and engineers are now being employed for the building and management of many sorts of works and industries, where formerly the employment of engineers was not thought of, and possibly there may be sufficient to keep all occupied. I repeat, however, that as regards the Government engineering service, the Committee should consider how it may best be organized to design and carry out the great public works which must be entrusted to it, as well as how it should be paid.

Mr. Chairman, it is a great pleasure to hear one of our oldest and best informed members express himself so clearly in regard to this matter. There are so many channels in engineering industry in this country that no national expenditure can be embarked upon without a Consulting Board of Engineers in some form. The practice in the great republic to the south has been, in the case of large harbour works, that the surveys are made, and then the Chief of Engineers at Washington receives the result and the proposed plans. If the work is of sufficient magnitude he calls a board composed of men from all over the country, who are acquainted with that particular kind of work. They meet at the place and go thoroughly into the plans. A modified plan, after they have conferred on it, is signed by each member, including the man who originally made the design. Then they can go ahead with that work, and the man who made the design has not the burden of the full responsibility hanging over him. This is most important, and I should certainly like to see the Committee work towards the organization of an Engineering Corps. Being a graduate of the Military College, I know something of the way Engineer Corps are run, both in Great Britain and the United States. The thought that I had given to the matter leads me to the conclusion that it is almost impossible to establish a corps without some method of insurance. The very best men on that corps will eventually become old and unable to give the same service that they originally did. They may know it themselves, but if they resign they have nothing to look forward to but poverty. If we could arrange for a thoroughly good pension system we would have a sound financial basis to work on in the re-organization of our engineering service. Mr. Dodwell

Mr. Chairman, I consider the point brought up by Mr. Kennedy one of the most important that we have had before this Society. In the work of the Transportation Committee we have remarked that there is no engineering authority in the country to control Government expenditure with a view to getting the best results on transportation. We hear discussions of the Georgian Bay Canal, the enlargement of the Welland, the National Trans-Continental Railway, etc., and yet these projects are only vaguely understood by the general public and not much less vaguely by the engineers, because they are unable to get the necessary data upon which to form a proper judgment. The data may be in the possession of transportation companies and not available, so that Parliament often deals with vast subjects on which it has little or no authentic information. There should be some system by which men having expert knowledge could be utilized in the public service. If a Committee is appointed I would suggest that its members be selected with as much care as possible, in order that the report of the Com- Mr. Jamieson

Mr. Jamieson

mittee may be a credit to the Society and increase its prestige. The subject should be dealt with most minutely and carefully.

Mr. Dodwell

Mr. Kennedy appears to be under the impression that the chief object of my motion and of this movement is an increase in pay. I wish to assure him that such is not the case. We shall not object to an increase, if it comes our way, but the main object of the movement is to get an improved Government engineering service. Mr. Warburton quoted the scales of pay in the Australian and Indian services. The Australian salaries of Government engineers are not better than ours, but they are better adjusted, better graded. The pay of engineers in India is certainly higher than ours, but the country is a very disagreeable one to live in, and a man cannot live there as long as he can in Canada. After a few years' service his health is undermined and he is forced to retire. I would rather have four thousand in Canada than eight thousand in India. I think most men would. Increase of salary is not the principal object of this movement. It is to develop a thoroughly first rate, properly graded engineering service. My idea is that young men should enter that service on passing a competitive examination or on presenting their testimonials, credentials, or degrees from some scientific or engineering college, and that they should rise step by step from junior to assistant engineer, and so on; promotion to be by examination and by merit, until they rise to the highest grade. We have seen many engineers appointed from the outside to posts high up in the Government service. There is no system of promotion and no standard of efficiency. I thought I had made all this clear in my remarks on Tuesday night, but I appear to have failed in doing so. Mr. Kennedy and Mr. Jamieson have both referred to the desirability of having the Government Engineering service so constituted that an Advisory Board of the highest skill could at any time be called upon to advise the Government in regard to expenditure on important works. Surely, under a reformed and reorganized service, that Advisory Board becomes a very simple matter. At present there is no system of pension or superannuation in the Civil Service. Neither is there in Australia, but there they have compulsory insurance for every civil servant. Each servant contributes so much from his salary as a premium on a policy commensurate with his salary and responsibilities. In India, of course, there are pensions, because after a dozen years of work there a man goes back to England with his health, in many cases, shattered. The service there could not exist without a liberal pension system. I have gone thus fully into these subjects because many of the gentlemen here this morning were not present on Tuesday. I shall be glad to answer any questions.

I would like to hear the resolution. Col. Ruttan

I cannot fully agree with Mr. Dodwell regarding an examination on entering the service, and at each successive step. I think the standard of the Canadian Society of Civil Engineers should be a sufficient warrant to admit any one to the service. The President

At the suggestion of Mr. Kennedy I would add to my resolution that copies of Hansard should be used. Mr. Dodwell

Moved by Mr. Dodwell, seconded by Mr. Leofred, that the President be asked to name a Committee to memorialize the Government on the subject of an improved engineering service, and that the Council be authorized to have Mr. Warburton's speech and the Honorable Mr. Pugsley's reply printed and circulated, provided that a sufficient number of copies of Hansard cannot be secured. The President

Mr. E. J. Walsh.—Mr. Chairman, I listened to Mr. Dodwell's very comprehensive remarks the other evening, and I think he has covered the ground fully. There is an impression that engineers are not business men, and in regard to the great works undertaken by this country, they are not considered, except in questions of a technical nature. Why should not the Society endeavour to remove the impression that engineers are not business men ? The work engineers are called upon to do brings them in contact with contractors and other business men, so that by force of circumstances, if in no other way, the engineer gains an insight into business methods. Mr. Walsh

That will be treated as a suggestion to the Committee. The President

I believe we will never impress on the Government the advisability of increasing the salaries of the engineering employees if we do not make efforts to raise the standard of admission to this Society. If we read pages 110 to 122 of the report of 1909 and the letters to Council concerning the qualification for admission to the Society, we will find very clearly that the majority of the members do not consider the mode of admission sufficiently high. At first we had to admit whoever was practising so as to form a nucleus, but now that the Society has become strong, and when the most prominent engineers admit that we are becoming too numerous and should look more to the quality than the quantity, I think it is time to raise the standard of the profession required for admission to this Society. Mr. Leofred

I would call on the Chairman to correct Mr. Leofred's statement with regard to the qualification for entering the Society. Col. Anderson

As you gentlemen know, during the past year, under the new By-Laws, the elections have been watched, special regard being given the qualifications of the men elected to the Society. The President

Are you ready for the question ?

Carried.

The Committee will be composed of the following gentlemen to confer with the Council in the matter:

The President Mr. H. Holgate, Chairman; Mr. M. J. Butler, Mr. J. A. Jamieson, Mr. F. L. Wanklyn, Col. Ruttan, *ex-officio;* Mr. H. J. Cambie, Mr. G. J. Desbarats, Mr. A. St. Laurent, Mr. L. A. Vallee, Mr. H. J. Lamb, with power to add to its numbers.

The meeting is now open for general business, and I think Mr. Walsh has a resolution.

Mr. Walsh Moved by Mr. Walsh, seconded by Mr. Dodwell, that a special Committee be appointed for the purpose of investigating and reporting on the question of "Sewage disposal with reference to the pollution of lakes and streams in Canada," said Committee to consist of the following persons, viz.: Messrs. R. S. Lea, John Kennedy, W. Chipman, R. W. Leonard, J. S. Dennis, C. H. Keefer, H. J. Cambie, C. R. Coutlee, together with the mover and seconder, with power to add to their number.

Mr. Walsh then read some extracts from addresses and reports to show the effect of stream pollution on the public health, and said that: We are all aware, Mr. Chairman, of the outbreaks of typhoid, in the various centres of population, and in the smaller towns and villages throughout the country. As we read from the reports of the medical men and Boards of Health this is largely due to pollution of the waters of the country.

In the town of Aylmer, a few miles above Ottawa, I understand they recently commenced to pour the sewage into the Ottawa River, and I suppose it is for that reason that the water has been proved to be impure at Ottawa. True, at Ottawa we do the same thing. At Montreal they have had a typhoid outbreak of considerable proportions and unfortunately, as is usually the case, a great many deaths. The same thing takes place throughout the country; they take the simplest means of getting rid of the sewage, regardless of what may happen to their neighbours. As the towns and cities grow this condition becomes worse; we are making cess pools of our lakes and streams. Afterwards attempts are made to purify the water. I think the time has arrived when this Society should inquire to what extent sewage is disposed of by pouring it into lakes and rivers. This is a large undertaking which I think the Society should investigate at once.

Mr. Leofred Does the speaker know that the Dominion Government is introducing a clause into the criminal code making it an offence to allow sewage in a crude state to flow into any navigable river or tributary thereof ?

Mr. Walsh I do not know that such law has passed yet. At any rate the action of the Society would not interfere at all with that of the Government.

Mr. Leofred It may be if the legislation has been introduced, our action will have less reason. As owner and operator of several sewer and

waterworks plants in the country, I think we should be very careful of the way we act. I have been notified sometimes by the Board of Health to purify the sewers in some of my sewer plants, and I found on investigation that in some cases it would cost much more than the sewer plant itself. I have also been notified that the water was not exactly pure, that it contained a few bacilli per million gallons, and that it would be a good thing to install filters. On investigation I found that the building and operation of a filter would cost more than the waterworks. The advisability of purifying water systems and sewers has often been brought up for the City of Montreal, but they have not found it practicable. If all the small towns and municipalities are compelled suddenly to purify their sewers and water supply, probably they would not be able to build either sewers or waterworks, and they will be in a worse condition than at present. Of two evils they must choose the lesser, and people would rather have a waterworks plant and a sewer system, even if not perfect, than nothing at all. If there can be no sewer outlet into a navigable river, and if no one can supply a town with water, unless it is filtered, there will be very few waterworks and sewer plants built. Mr. Leofred

I referred particularly to waters, whether navigable or otherwise, from which drinking water is obtained. The larger the body of water the less the danger will be. As to salt water, I do not think that affects the question at all. It is for the meeting to say whether they will adopt my motion or not. I consider it right that steps should be taken at once to put a stop to the pollution of streams. Mr. Walsh

Just a word, Mr. Chairman. I notice that my name is put first on that Committee, which, I presume, means that I shall be chairman or convenor. I am quite willing to serve upon the Committee but it will be a difficult one to work, as the members are widely scattered. I would rather not undertake that office, but will serve on the Committee. Mr. J. Kennedy

We have added the names of Mr. Lea and Mr. Coutlee to those at first proposed. If Mr. Walsh is agreeable we will put Mr. Lea's name first. The President

Certainly, I am agreeable to anything that Mr. Kennedy desires. Mr. Walsh

The motion was carried.

Last evening some of you heard the Hon. Mr. Sifton make a suggestion upon which, I think, the meeting will be glad to act. If there is a resolution ready it may come before the meeting now. The President

Mr. Chairman, in reference to the movement now being instituted for the conservation of natural resources in Canada, the Hon. Mr. Sifton last night suggested to the Society the advisability of some of the members being placed on a Committee, or of the members as a whole acting to help and to reinforce the investigations of the Mr. Coutlee

Mr. Coutlee Commission, and to lend assistance. It would probably be better that the members appointed from the Society should be chosen by provinces or districts, and to that end I have framed this resolution. I think that to make a hurried selection of the members of this meeting would not be in the best interests of the Society; it had better be left to the incoming Council to actually name the members. I have pleasure in moving, seconded by Col. Ruttan, that a Standing Committee of members of the Canadian Society of Engineers be appointed as follows:

From Prince Edward Island, 2; Nova Scotia, 2; New Brunswick, 2; Northern Quebec, 2; Southern Quebec, 2; Northern Ontario, 2; Southern Ontario, 2; Manitoba, 2; Saskatchewan, 2; Alberta, 2; British Columbia, 2; total, 22. This Committee should devote its energy to the conservation of resources, first by drawing attention to waste of lands, forests, minerals, or water power; second, by drawing attention to a lack of development of natural resources; third, by drawing attention to desirable improvements in various industries or measures for protecting public health; fourth, by indicating general schemes of economic and permanent development.

Col. Ruttan I have much pleasure in seconding that resolution, and I would suggest an addition to indicate why that Committee has been formed.

Mr. Leofred In the choice of the members I would suggest that the local branches be consulted and their approval obtained.

The President I think in all these matters the Council takes into consideration the suggestions and the approval of the branches.

Mr. J. Kennedy What is meant by the expresion, "devote their attention?" Is that just as ordinary Committee work ?

The President Yes, it is only Committee work.

Mr. Coutlee My idea is that as matters demanding action come before the members of the Society in their ordinary work, they should report them to the Committee, and thus give assistance to the Commission.

Mr. Leofred I suppose the members of the Committee will have to be experts in the different lines indicated ?

The President I think so. You all heard last night what Mr. Sifton said and the resolution is plain. Are you ready for the question ?

Carried.

Mr. Higman At the International Electrical Congress, held in St. Louis in 1904, it was declared desirable to appoint an International Electro-Technical Commission, and the following resolution was passed: "That steps should be taken to secure the operation of the Technical Societies of the world by the appointment of a representative commission to consider the question of the standardization of the nomenclature and ratings of electrical apparatus and machinery," and as the Government delegate on that occasion I was

requested to bring this to the notice of the Canadian Technical So- Mr. Higman
cieties. I wrote to the Secretary of this Society, and in response to that communication Dr. Owens was appointed a member of the proposed Canadian Committee, and I believe another gentleman was also appointed. They attended a meeting of the International Congress in London, but Dr. Owens failed to follow up the work and complete his committee. The council in London have requested me to nominate a Committee, but in order that we may be legally and technically established I come back to the Society for confirmation. I, therefore, nominate the following to be the Canadian National Committee of the International Electro-Technical Commission: Messrs. H. T. Barnes, William Archibald Duff, L. W. Gill, L. A. Herdt, O. Higman, A. B. Lambe, John Murphy, R. T. Rosebrugh, J. J. Wright, and one representative from The Canadian Westinghouse Company, The Canadian General Electric Company, and the Allis-Chalmers-Bullock, Ltd.

I may also say that this involves nothing so far as the Canadian Society is concerned. It is simply a technical legal matter that will have to go back to the original resolution, and I am simply asking the Society to confirm these names, not to father the Committee in any respect. There will be no obligation so far as this Society is concerned.

I move, if I can get a seconder, that the nominations made Mr. Ker
by Mr. Higman of members of the proposed Canadian National Committee of the International Electro-Technical Commission, be confirmed.

The last three are not members of this Society. I do not know The President
whether we have power to make any nominations except from our own members.

This is not a Committee of the Society. It is simply a request to Mr. Higman
confirm something that we wish to do initially to establish ourselves. We may be able to increase or diminish the number or make any changes hereafter, but at present our difficulty is that we are unable to start.

Mr. Chairman, this is a matter that I do not profess to know any- Col. Anderson
thing about, but it looks as if we might be committing the Society without knowing it. Would it not be better to have the resolution considered by Council first? I would vote against the motion in its present form, not that I have any objection to it *per se*, but it seems to me there has been no opportunity to consider what this leads to. Why did not the Council bring it before the meeting?

The present Commission, in order to get a Canadian Committee Mr. Higman
established, asked me to make a nomination and get it confirmed by one of the Canadian societies. The Secretary's letter of May, 1906, is to the effect that Dr. Owens was appointed a representative of this

Mr. Higman — Society to the Committee on Standardization. So that it has been before the Council, and they recognized our efforts.

Mr. Ker — Mr. Chairman, I think it would be sufficient to say that at the last meeting in London some rules were proposed and adopted, and it was decided that these local committees should be formed by the technical societies. It was thought only fair to this Society that they should be asked to approve of the formation of the Commission. That is practically all that is asked. Mr. Higman was requested to act, because no steps were taken to appoint a Committee. If it is objectionable, we could strike off the names and ask the Society to approve of the formation of a Committee. The work to be carried out by the Commission is principally one of notation. The text books are practically unintelligible because each writer uses a notation of his own, and different countries have different notations. If we say that National Standardization of Notation is important, International Standardization is much more important. That is one of the works this Commission intends to do.

The President — Mr. Ker, as mover of that resolution, will you read out the names of those that are members of the Canadian Society of Civil Engineers ?

Mr. Ker — I do not know if all are members or not. Dr. Barnes and Prof. Rosebrugh, I imagine, are not. We might strike out their names and get the confirmation of the Society without them.

Dr. Galbraith — Mr. President, this matter is not very clear to many members of the meeting. I think it would be better to refer the proposal to the Council for consideration.

Mr. Higman — If it is the general wish of the meeting that it should be presented to the Council I shall certainly be very glad to withdraw the motion.

Dr. Galbraith — Then I beg to move, seconded by Mr. Jamieson, that this proposition be referred to the Council for consideration.

Carried.

The President — There are a few matters upon which I would like some discussion. First, the increase of payments to the branches, a matter which was mentioned on Tuesday. It is thought that the Society cannot afford to increase these grants. It occurred to me that the members of branches should pay the same fee as the Montreal members, and then we might make a rebate of a little more than the $2 given at present.

Col. Ruttan — This is a matter that requires careful consideration, and I think it would be better to refer it to the Council. I move that the matter of increased payments to branches and the financial relation of the branches to the parent Society be considered by the Council for the coming year, and that the Council be requested to report at the next Annual Meeting.

Mr. President, I would like to second that and to add that the Council should consider the advisability of increasing the fees of the membership as a whole. Our fees are very low as compared with other societies. In the American Society of Civil Engineers they are $15 per year, and in the British Institution practically the same. Our fees for all except those at headquarters, are only $8 a year, which does not give us enough money to do some of the things we want to do. Our Special Committees, as has been mentioned over and over again, are crippled for want of money. I am doubtful about giving money for travelling expenses except possibly under special conditions, but no committee can carry out investigations without a good deal of clerical assistance, and to provide that we must either have an increase in the regular clerical staff so that it may be called upon for such services, or special assistance must be employed. It must be remembered, too, that money does not go as far as it did towards the general expenses of the Society. Mr. J. Kennedy

As a Member of the Council which framed its organization, I feel entitled to say that I think we have drifted from the original intention, which was that the full membership should pay $10 a year, and non-residents at headquarters should have remitted $2 of that $10, until such time as a branch was formed, when that $2 should be collected and used for the good of the branch. That was certainly the original intention of the Committee, but in practice it has worked out that non-resident members pay $8, and out of that $2 has been remitted, so that they get off for $6 to the parent Society, and $2 to the branch. There should be no difficulty, where there are branches, in increasing the fees of non-resident members to $10; the $2 to be remitted for the use of the branch. That would put them on the same footing as headquarters members, and I think it would give, with the branches we have now, an additional income of probably $1,000. I disagree, to a certain extent, with Mr. Kennedy, with regard to the advisability of increasing the fees. Probably part of the success of the Society has been due to the fact that we have been able to run it without a very heavy tax on the members. As long as we can keep the fees at $10 and cover the expense, and possibly put by a little nest egg, it is desirable that there should be no change. Col. Anderson

One other point might be considered. It is well to make the fee as light on the actual student as we can, but I think the privilege of remaining a Student Member is abused. Considerable revenue might be derived by looking after that more closely. I know of at least two cases in the past where members remained "Students," although they were receiving salaries of $125 and $150 a month. They were not contributing enough to cover the cost of giving them the *Transactions*. While it may be well to be as lenient as possible for a time after graduation, I think that time should be limited. Mr. Jamieson

The President — The Council has given some thought to that question during the past year.

Mr. Coutlee — I had something to do, Mr. Chairman, with the formation of the Ottawa branch, which has prevented a good deal of the trouble that Mr. Jamieson refers to. We drummed up those who were remaining students over time, and they have become Associate Members or Members. We might consider the formation of a grade between Student and Associate Member, viz., a class which might be called "Juniors." The question of an increased revenue has become rather pressing, because the quarters in Montreal are entirely too small. I remember two important papers read when there was not sitting room in the lecture hall for those who attended. The Secretary tells me that the hall holds 230. The incoming Council may have to consider obtaining new quarters.

Dr. Galbraith — A few days ago Mr. Thomson, one of our members from New York, handed me a slip showing that the membership of the American Society of Civil Engineers was somewhere over 5,000; ours over 2,000; and the income of the American Society, $130,000; ours, $13,000. That is, with nearly one-half the membership we have only one-tenth the income. That is largely due to the fact that Mr. Jamieson has mentioned; we have twelve hundred Student Members, or members paying as Students. The time that a man may remain a Student Member is, I believe, nine years. I think some regulation might be made to divide that class into two. It would hardly do to say graduates and under-graduates, because all our Student Members do not go to the engineering schools, but, I think, if the time were shortened to say four years and another grade created, it would be well, and, in fact, necessary, for there are many men who have outlasted their four years and yet would not fulfil the conditions for Associate Membership, and I am sure we do not wish to lower that.

Mr. Walsh — Is there any age limit for Students ?

The Secretary — There are only age requirements for Members and Associate Members. There is a time limit of nine years for Students.

Mr. Leofred — I understand that the Council of 1909 has studied the question and came to the conclusion that the fees are not sufficient; why then should we hesitate about paying $2 or $3 more ? When the Treasurer, no doubt voicing the opinion of the Council, said we should pay more, why should we appoint Committees and deliberate on the question for years ? There is no necessity for members spending their time considering whether a dollar, more or less, should be given. Money paid to the Society is not wasted; it is just as good as if paid into a bank.

The President — It has been moved and seconded then that this matter be referred to the incoming Council.

Carried.

We come now to reports of the scrutineers. First as to the By-Laws. The President

This is the report of the Committee on By-Laws. "We hereby certify that there have been 207 votes cast for amendments to By-Laws, 169 ayes and 38 nays." That gives more than the necessary two-thirds majority. The report is signed by F. A. Drought, Chairman; A. R. Ketterson, H. W. Jones, and F. J. Delaute. The Secretary

I declare the amendments to By-Laws carried. The President

By-Laws 35 and 36 require a recommendation by the Council regarding the geographical district therein mentioned. The Secretary

The proposed sub-division of territory is as follows:

District No. 1, Montreal, number of resident members, 240.

District No. 2, Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, and the United States, 180.

District No. 3, Quebec, outside of headquarters, and including members resident outside Canada, Newfoundland, and the United States, the former 121, and the latter 59, in all, 180.

District No. 4, Ottawa and Ontario, east of and including Lindsay; Ottawa Branch, 124; Ontario, 56; total, 180.

District No. 5, Toronto and Ontario, west of Lindsay and south of Georgian Bay and Lake Simcoe, the former portion 100, and the latter 80; total, 180.

District No. 6, Winnipeg, with 72 members, the other parts of Manitoba 14, and Ontario, north of Georgian Bay and west of Lindsay, 74; total, 160.

District No. 7, west of Manitoba and east of the mountains, 75, the British Columbia Branch, 105; total, 180.

These numbers, of course, are all approximate. The President

Your Council recommends that the members of the Nominating Committee, required under By-Law 36, be as follows: District No. 1, Mr. E. Marceau; District No. 2, Mr. R. McColl; District No. 3, Mr. St. G. Boswell; District No. 4, Mr. M. Donaldson; District No. 5, Mr. E. H. Keating; District No. 6, Mr. E. E. Brydone-Jack; District No. 7, Mr. F. F. Busteed. A resolution of the meeting is required for the election of these gentlemen.

Moved by Col. Ruttan, seconded by Mr. Dietrich, that the gentlemen named by the President be elected as the Nominating Committee.

Carried.

There is a vote under the old By-Laws for the Nominating Committee, and a report is in the hands of the scrutineers. The Secretary

Moved by Col. Anderson, seconded by Mr. Coutlee, that the vote for the election of Scrutineers under the old By-Laws being null and void, the ballots be destroyed.

Carried.

The President — The next is the report of the election of Officers and Members of the Council.

The Secretary — Two hundred and sixty votes were cast for the election of Officers and Members of Council, and the following have been elected, in the order named:

President—H. N. Ruttan.

Vice-Presidents—

W. F. Tye.
C. H. Rust.
R. W. Leonard.

Councillors—

C. R. Coutlee.
Phelps Johnson.
H. J. Cambie.
D. MacPherson.
A. E. Doucet.
L. A. Herdt.
J. A. Bell.
C. E. W. Dodwell.
C. N. Monsarrat.
J. G. Sullivan.
A. W. Campbell.
J. M. R. Fairbairn.
J. M. Shanly.
H. H. Vaughan.
W. J. Francis.
J. E. Hardman.
H. E. T. Haultain.
H. G. Kelley.
R. J. Durley.
R. S. Kelsch.

Signed by O. P. Schrieber and the other members of the Committee.

The President — I have much pleasure in declaring these gentlemen elected.

Moved by Mr. Lamb, seconded by Mr. Coutlee, that the ballots be destroyed.

Col. Ruttan, the newly-elected President, took the chair.

Col. Ruttan — I thank you, gentlemen, for the highest honour that a member of this Society can receive at your hands. I am not vain enough to imagine that the matter is altogether personal. I can quite understand that you have been considering the feelings of the large and growing portion of Canada which is just now being opened up for development—a portion of Canada in which there is now work for many hundreds of engineers, and where we will send many hundred in the next few years. The water powers to be developed in that

country, the railways to be constructed, and the canals and navigation works under consideration and in progress, will take within the next ten years, I am confident, more than double the number of engineers that we have now in this Society. That may seem a very sanguine view of the progress of the North-West, but having watched it carefully for the last thirty years, and seeing the enormous progress of the last ten years, I do not think I shall be very much disappointed in this estimate of the future. As the hour is late I know you will thank me for not extending my remarks at the present time. Col. Rutan

Moved by Mr. Leofred, seconded by Mr. Coutlee, that a vote of thanks be tendered the retiring President and officers for the excellent work accomplished by them during the past year of 1909.

Carried with applause.

Mr. Mountain, and gentlemen, I have much pleasure in conveying to you the thanks of the Society for your services during the past year. The President

Mr. President, and gentlemen, I heartily thank the Society for the manner in which the resolution was carried. I am sure what we have done has been a labour of love, and if we have in any way advanced the interests of the Society during the past year that is sufficient reward. I thank you on behalf of the retiring officers. Mr. Mountain

There is one question which I think is important, and which ought to be brought up at this meeting; that is the place of meeting next year. The people of Winnipeg would be delighted to see the Society there for the next Annual Meeting, and they would, I am sure, do everything in their power to make the visit pleasant for you. If this is the proper time to determine upon that, I would be glad if some one would offer a resolution to that effect; either that the meeting be held in Winnipeg, or that the matter be referred to the Council. The President

The meeting in different places is something not provided for. We would automatically meet at headquarters if there were no resolution to the contrary, but the Council would have to decide the matter in any case. Mr. J. Kennedy

It is usually dealt with by Council. I move that the matter be left to it. Mr. Mountain

It is an important question and the Council should consider carefully whether we are going to move every year to different points for our Annual Meeting, or only occasionally. They might consider holding the Annual Meeting at headquarters and summer conventions at different points. We were in Toronto last year, this year in Ottawa, and if next year we go to Winnipeg we shall be establishing a precedent that may cause trouble. Mr. Jamieson

I would not like to run opposite to the President, and I thank him for the kind invitation to Winnipeg; I will join with the other Mr. Leonard

Mr. Leofred — members if they decide to go there. At the same time, on behalf of the Quebec Branch, I would invite the Society to Quebec next year, with the understanding that we will do all we can to make the visit of the members interesting and enjoyable.

The President — Then it is understood that the matter will be left with the Council. The arrangement for the summer excursion also requires attention.

Mr. Mountain — I move that that be left to the Council. Last year we had a delightful summer convention, although not largely attended. We visited a most important work, the tunnel under the Detroit River at Windsor, and I think every member who attended, enjoyed the scientific treat afforded us.

The President — Then that is the understanding. The Council will meet at half-past three.

Mr McCall — I wish to move, seconded by Mr. Freeland, a vote of thanks on behalf of the visiting members to our hosts, the Ottawa Branch, and to the Electrical Railway Company, the J. R. Booth Company, the E. B. Eddy Company, the city officials of the waterworks, the officers of the Dominion Archives, Royal Mint and Observatory, the Edinburgh Mills, and to the Mayor and City Council of Ottawa. I am sure that everyone who has been here feels that no mistake was made in holding the meeting in the City of Ottawa. Nothing could exceed the kindness shown by the members of the Ottawa Branch in their handling of this meeting. Every one must have fully appreciated the great kindness of Mr. Booth, who personally conducted us through his mill.

Mr. Mountain — Mr. President, I wish to move a vote of thanks to the Entertainment Committee, who looked after our comfort here during the last two or three days. I may say that, although I am an Ottawa man, I was not permitted to help with the work. I allude particularly to Messrs. Donaldson, MacPherson, Coutlee, Chapleau, and Ker. Carried.

Moved by Mr. Leofred, seconded by Mr. Coutlee, that whenever a candidate is chosen by the Nominating Committee for any office in the Canadian Society of Civil Engineers, the Nominating Committee shall get the sanction of their choice for such candidates by the local branch, to which such candidate may belong. If such candidate does not belong to any local branch then he shall be chosen in the usual way.

The President — Are you ready to discuss this motion? It seems rather important.

Mr. Mountain — We have just passed a new By-Law on this subject. Let us wait long enough to see how it will work. The former system required so many sanctions that it was very difficult to get a Council. Let us go on as we are.

This would virtually be an amendment of the By-Laws if it were adopted. The Secretary

The idea is that we are often called upon to vote for candidates that we do not know anything about, and this is to provide a wise mode of selection. If a branch does not sanction the choice of a candidate of their own members they must have good grounds for it. Mr. Leonard

I would suggest that this motion, which is a very important one, be left over for the next meeting. Let it stand as a notice of motion. The President

It seems to me to introduce a bad principle. It permits a branch to dictate to the parent society. Col. Anderson

I consent that the motion be left over until next year. Mr. Leonard

The meeting then adjourned.

The

Canadian Society of Civil Engineers

413 DORCHESTER STREET WEST, MONTREAL.

Established Feb. 24, 1887; Incorporated by Dominion Act, June 23rd, 1887

(50 Vic., Cap. 124)

Report of Annual Meeting

1911

VOLUME XXV

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Canadian Society of Civil Engineers.

REPORT OF PROCEEDINGS OF THE TWENTY-FIFTH ANNUAL MEETING, HELD IN THE ROYAL ALEXANDRA HOTEL, WINNIPEG, 24TH TO 27TH JANUARY, 1911.

The President, Col. H. N. Ruttan, in the chair.

Morning Session, January 24th, 1911.

The President

Col. H. N. Ruttan.—Gentlemen, before opening the meeting and going on with our regular business, I would suggest to the members present that it would be fitting for us to express our sense of the great loss which this Society has sustained in the death of one of its most prominent members. I refer to the death of Mr. J. E. Schwitzer, which occurred yesterday morning. The engineers of Winnipeg feel this matter with peculiar sadness, as Mr. Schwitzer has been here so long and so many of us have been intimately associated with him. Our business relations have always been most pleasant, however intricate or involved they were. The fact that Mr. Schwitzer had just received what we who knew him well consider the just reward of his merits as an engineer and a faithful servant of the Company with which he was employed, enhances this feeling. He would not, I am sure, have had us change our programme in any way, would not have had us cut out a college song or anything of the kind, still we feel that we could not with any heart go on with the smoking concert to-night. It was therefore decided at a joint meeting of the Local Committee and the Members of the Council yesterday morning to cancel the smoker. I would suggest to the meeting that we should take some action in respect to Mr. Schwitzer's death.

Mr. John Kennedy

Mr. John Kennedy.—Mr. President, the sad duty has fallen upon me of moving a resolution expressing our regret at the death of Mr. Schwitzer and of condolence with his widow. I regret greatly that I have not words to do so fittingly. You who knew him so intimately here in Winnipeg, and those, his fellow-officers on the Canadian Pacific Railway, who recognized his great ability, his sound judgment and grasp of affairs, and his genial manner, have rejoiced at his rapid promotion, and especially the latest step which seemed to crown his progress, for the Chief Engineership of the Canadian Pacific Railway is undoubtedly one of the prizes of the profession. It would be useless for me to try to impress upon you

the worth of Mr. Schwitzer, and it would only deepen your sadness to dwell upon it. Throughout Canada Mr. Schwitzer was greatly appreciated and looked upon as a worthy successor, not only of those who had preceded him in that particular office, but probably also of such men as Samuel Keefer, Walter Shanly, and Col. Sir C. S. Gzowski, John Page, and others. His sudden death is therefore all the more keenly felt. I move the resolution, which the Secretary will be kind enough to read for us.

The Secretary

THE SECRETARY.—"Be it resolved that the members of the Canadian Society of Civil Engineers, assembled in Annual Meeting in Winnipeg, desire to take the opportunity of expressing their sorrow on hearing of the sudden death of Mr. J. E. Schwitzer, one of the most distinguished members of the Society. This sorrow is emphasized by the fact that he had just received promotion to the Chief Engineership of the Canadian Pacific Railway, which appointment marked the appreciation of a great corporation for one of its most able and devoted officers. Mr. Schwitzer was one of the most manly, lovable, and popular of the members of the Society, and his death is mourned by each member as a personal loss.

"Be it resolved that the Society respectfully begs to express its deepest sympathy with Mrs. Schwitzer in her bereavement, and that a copy of the above resolution be forwarded to her."

Dr. Galbraith

DR. GALBRAITH.—I beg leave to second the resolution which has just been read. It does not become me to add anything to what has been said. I had not the pleasure of meeting Mr. Schwitzer until within the last three or four years, and I wish at least to bear testimony to the genial and lovable character of the man. I am sure that this resolution expresses the regret which we all feel, and it is peculiarly fitting that at this Annual Meeting in this city of Winnipeg, and in this Canadian Pacific hotel, we should now carry such a resolution.

The motion was carried unanimously by standing vote.

The President

I now declare the meeting open for the transaction of business. The first order of business is the reading of the minutes.

The Secretary then read the minutes of the last meeting.

The President

You have heard the minutes. Are there any objections? If not, I declare them confirmed.

The next order of business is the nomination of scrutineers. The following members have been nominated as scrutineers of the ballot for officers and members:

Mr. E. P. Featherstonhaugh, *Chairman.*
Mr. A. R. Dufresne.
Mr. G. E. Howie.
Mr. L. B. Elliot.

For scrutineers of the By-Laws, the following are suggested:

Mr. J. G. LeGrand, *Chairman.*
Mr. M. P. Blair.
Mr. F. P. Shearwood.
Mr. H. A. Bowman.
Mr. James White.

Carried.

If the Chairmen of the Scrutineers will meet in the office, the ballots will be turned over to them at their convenience. The President

The next order of business is receiving the Report of Council.

REPORT OF COUNCIL FOR THE YEAR 1910.

The Council presents the following report on the work of the Society during the past year:

Roll of the Society.

The elections took place as follows: Nineteen Members, one hundred and seven Associate Members, four Associates, and one hundred and twenty-six Students—in all, two hundred and fifty-six. Twenty Associate Members were transferred to the class of Member, one Student was transferred to the class of Member, fifty Students were transferred to the class of Associate Member, and one Student was transferred to the class of Associate. There have been thirteen deaths—seven Members, three Associate Members, and three Students. There have been removed from the rolls by resignation, and on account of non-payment of dues, eight Members, nine Associate Members, seven Associates, and fifty-one Students.

At present the membership stands as follows:

	Res.	Non-Res.	Total.
Hon. Members	3	11	14
Members	102	446	548
Associate Members	145	804	949
Associates	17	26	43
Students	266	919	1,185
Total			2,739

In addition to the foregoing, there are before the Council 35 applications for Corporate Membership. These, if added to the above, would make a total membership of 2,774.

At the same time last year the total membership was as follows:

	Res.	Non-Res.	Total.
Hon. Members	3	11	14
Members	94	427	521
Associate Members	133	691	824
Associates	17	28	45
Students	289	876	1,165
Total			2,569

Annual Meeting.

The twenty-fourth Annual Meeting was held in the City Hall, Ottawa, from the 25th to the 27th January, 1910, Mr. G. A. Mountain, President, in the chair. The first session was called to order on Tuesday, 25th January, at 10.30 a.m., and the Meeting was adjourned on Thursday, the 27th, at 1 p.m.

Meetings.

The Council has held nine meetings during the year. There have been twelve sectional meetings of the Society.

The following papers and addresses were presented:

General Section:

"A Reinforced Concrete Pile," by E. Mohun, M. Can. Soc. C. E.

"The Conservation Problem as Applied to Canada," by C. R. Coutlee, M. Can. Soc. C. E.

"Subaqueous Concrete Work," by H. R. Lordly, M. Can. Soc. C. E.

"Grade Separation," by W. H. Breithaupt, M. Can. Soc. C. E.

"Fort William Water Supply," by H. Sydney Hancock, Jr., A. M. Can. Soc. C. E.

"Some Recent Developments in the Purification of Public Water Supplies," by R. S. Lea, M. Can. Soc. C. E.

"Some Considerations on the Theories Governing the Elastic Breakdown of Members Subjected to a Compound System of Stresses," by A. S. C. Trench, Stud. Can. Soc. C. E.

"Traction Stresses," by S. Blumenthal, A. M. Can. Soc. C. E.

"A New Water Supply for the City of Vancouver," by H. M. Burwell, M. Can. Soc. C. E.

Electrical Section:

"Resonance in Alternating Current Circuits," by J. Dalemont.

"A Discussion on One of the Problems of Submarine Cable Telegraphy, with a possible Solution," by E. S. Heurtley, Stud. Can. Soc. C. E.

Talk on the "Hydro-Electric Power Commission's 110,000 Transmission System," by P. W. Sothman, M. Can. Soc. C. E.

Mechanical Section:

"Turbine Pumps in Municipal Work," by W. C. Brown.

"Power Plant Practice," by J. A. Shaw, A. M. Can. Soc. C. E

Mining Section:

"Railway Construction and Tropical Experiences in the Gold Mines of Ashanti, West Africa," by Hilder Daw, A. M. Can. Soc. C. E.

Branch Societies.

The Chairmen and Secretaries of the Branch Societies during the year were as follows:

Manitoba Branch, Winnipeg:

Chairman—J. E. Schwitzer.
Secretary—E. E. Brydone-Jack.

Toronto Branch:

Chairman—A. W. Campbell.
Secretary—P. Gillespie.

Ottawa Branch:

Chairman—W. J. Stewart. A. A. Dion.
Secretary—S. J. Chapleau. H. V. Brayley.

Quebec Branch:

Chairman—A. E. Doucet.
Secretary—P. E. Parent.

Vancouver Branch:

Chairman—G. H. Webster.
Secretary—H. K. Dutcher.

Reports on the work of the Branches will be presented during the meeting.

Committees.

The following have been the Committees of Council during the year:

Library and House Committee:

R. S. Lea, Chairman.
F. P. Shearwood.
L. A. Herdt.
E. Marceau.
W. Kennedy, Jr.

Finance Committee:

H. Holgate, Chairman.
C. N. Monsarrat.
J. M. Shanly.
W. J. Francis.
E. Marceau.

The Gzowski Medal Committee:

L. A. Herdt, Chairman.
J. M. Shanly.
F. P. Shearwood.
W. Kennedy, Jr.
J. B. Porter.

The following are the Committees of the Society reporting to the Annual Meeting:

Nominating Committee:

G. A. Mountain, Chairman.
J. Galbraith.
H. D. Lumsden.
E. Marceau.
R. McColl.
St. G. Boswell.
M. Donaldson.
E. H. Keating.
E. E. Brydone-Jack.
F. F. Busteed.

Railway Ties:

D. MacPherson, Chairman.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
M. J. Haney.
H. G. Kelley.
Wm. McNab.
J. G. Sullivan.
T. C. Burpee.
H. A. Woods.
A. F. Stewart.
M. H. MacLeod.
W. A. Bowden.
W. B. MacKenzie.

Transportation Routes:

W. F. Tye, Chairman.
C. R. Coutlee.
H. O. Keay.
G. H. Frost.
Wm. McNab.
E. D. Lafleur.
F. W. Cowie.
J. A. Jamieson.
W. D. Barclay.
M. H. MacLeod.
C. H. Keefer.
A. St. Laurent.

Roadbed and Ballasting:

J. G. Sullivan, Chairman.
D. MacPherson.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
M. J. Haney.
W. McNab.
H. G. Kelley.
T. C. Burpee.
W. B. Mackenzie.
B. B. Kelliher.
H. A. Woods.
M. H. MacLeod.
A. F. Stewart.
L. A. Vallee.
R. McColl.

Rail Fastenings and Tie-Plates:

Howard G. Kelley, Chairman.
D. MacPherson.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
J. G. Sullivan.
T. C. Burpee.
A. Stansfield.
B. B. Kelliher.
A. F. Stewart.
L. A. Vallee.
H. A. Woods.
R. McColl.

Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.

Improved Engineering Service:

H. Holgate, Chairman.
A. W. Campbell.
J. A. Jamieson.
F. L. Wanklyn.
H. J. Cambie.
G. J. Desbarats.
A. St. Laurent.
L. A. Vallee.
H. J. Lamb.
H. N. Ruttan (ex-officio).

Establishment of Testing Laboratories:

C. H. Keefer, Chairman.
J. Galbraith.
H. M. Mackay.
J. A. Jamieson.
P. Gillespie.
G. E. Perley.

Usefulness of the Society and Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
J. G. G. Kerry.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Standard Specifications for Cast Iron Water Pipe and Special Castings:

N. J. Ker, Chairman.
R. S. Lea.
O. W. Smith.
E. A. James.
T. C. Irving, Jr.

Sewage Disposal, Etc.:

R. S. Lea, Chairman.
Willis Chipman.
J. S. Dennis.
H. J. Cambie.
C. E. W. Dodwell.
John Kennedy.
R. W. Leonard.
C. H. Keefer.
C. R. Coutlee.
E. J. Walsh.

Conservation:

C. R. Coutlee, Chairman.
H. F. Laurence.
R. McColl.
M. G. Henniger.
R. O. Sweezey.
J. M. Shanly.
W. H. Breithaupt.
G. A. Bayne.
A. J. MacPherson.
J. S. Dennis.
H. J. Cambie.
J. B. Hegan.
C. E. W. Dodwell.
E. T. P. Shewen.
A. E. Doucet.
R. S. Lea.
Jas. White.
R. W. Leonard.
E. E. Brydone-Jack.
W. R. W. Parsons.
John Chalmers.
T. H. Tracy.

The following were appointed in charge of the work of sections from June, 1910, to June, 1911:

Electrical:

L. A. Herdt, Chairman.
R. S. Kelsch, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
R. J. Durley, Vice-Chairman.

Mining:

J. E. Hardman, Chairman.
H. E. T. Haultain, Vice-Chairman.

General:

H. G. Kelley, Chairman.
J. G. Sullivan, Vice-Chairman.

OFFICERS.

The Council appointed Mr. E. Marceau, Treasurer, and Mr. C. H. McLeod, Secretary, for the year 1910.

Award of Gzowski Medal.

The Committee has made a unanimous report, recommending that the Gzowski medal be awarded to C. N. Monsarrat, Member, for his paper on "Construction of Lethbridge Viaduct, Crow's Nest Branch, Canadian Pacific Railway Company."

Prizes for Students' Papers.

Awards will be announced at the Annual Meeting.

The following is a statement of elections which have taken place since the issue of Bulletin No. 6:

8th October, 1910.

Members:

Brown, L. L.
Davies, J. V.
Donnelly, C. O'C.
Forgie, James
McPhillips, Geo.
Noble, Alfred
Webster, Henry.
Woodard, Silas H.

Associate Members:

Allaire, Alex.
Archibald, H. P.
Bouillon, A. M.
Brown, Wm. L.
Cinq-Mars, Marius.
Coltman, W. J.
Doyle, David
Freeman, C. B.
Gibb, H. M.
Gostwyck, G. H. G.
Heard, R. C.
Hewerdine, T. S.
Hunt, W. H.
MacPhie, R. H.
Rosseter, F. S.
Swartz, W. G.

Transferred from Associate Member to Member:

Ashcroft, A. E.
Hunter, R. E.
Smith, O. W.

Transferred from Student to Associate Member:

Baker, M. H.
Bowness, E. W.
Brown, F. A.
Cour, P. E. de la.
Freeman, J. R.
Hall, T. E. A.
Jewett, F. C.
Jupp, A. E.
Kennedy, H C.
Pope, H. B.
Scott, D. S.
Timbrell, Alan.

Students:

Archibald, C. B.
Baxter, H. K.
Blais, Robert.
Blue, W. E.
Dubuc, C. P. A.
Farley, A. E.
Ferguson, A. W.
Fisken, A. D.
Greene, E. A.
Gunn, A. S.
Hay, W. W.
Henry, R. A. C.
Kieffer, L. F. H.
Laliberte, Albert.
LaMothe, G. E.
Letson, J. E.
McEwan, A. B.
McLellan, R. B.
McMulkin, A. F.
Monkman, G. H. N.
Morrisey, T. S.
Nation, A. F.
Ness, Olaf.
Parr, C. B.
Peters, Hugh.
Quetteville, S. N. de.
Ross, J. W.
Saunders, W. L.

10th December, 1910.

Members:

Angstrom, Arendt.
Bellamy, F. J.
Brunlees, Howard.
Jones, R. W.
Willet, A. H.

Associate Members:

Archibald, G. DeW.
Adams, F. P.
Barnes, R.
Barton, R. A.
Bourgeois, L. F.
Coburn, G. W.
Cumming, R.
Ferguson, H. B.
Henderson, T. D.
Jennings, F. P.
McArthur, R. E.
McFarlane, J. A.
MacKenzie, C. M.
Nevitt, I. H.
Pardee, H. M.
Porte, W. B.
Robinson, L. G.
Storrie, William.
Smith, R. C.
Wanscher, C. O.
Weidman, W. R.

Associate:

Meriwether, Coleman.

Transferred from Associate Member to Member:

Burpee, D. W.
Craig, H. B. R.
Laurence, H. F.
Mattice, G. L.

Transferred from Student to Associate Member:

Babin, Arsene.
Bailey, J. R. A.
Becker, H. J.
Higman, O., Jr.
Howie, G. E.
Killaly, A. L.
McAllister, W. J.
Paradis, A. A.
Pense, E. H.
Willsie, I. F.

Transferred from Student to Associate:

Bowman, David.

Students:

Archibald, F. R.
Claveau, J. A.
Bryant, E.
Cram, H. R.
Child, C. G.
Cunningham, F. J.
Eakins, H. G.
Galbraith, J. S.
Hanning, J. T.
Hebert, L.
Hooper, J. W.
Hugh-Jones, E. B.
Kirkpatrick, A. M.
Lalonde, J. A.
Lariviere, A.
Lamarche, D. B.
Lawson, H. H.
Marcoux, G.
McMillan, H. W.
Melsted, V. J.
Mills, T. S.
Mitchell, L. S.
Munroe, H. R.
Papineau, C. J.
Price, C. B.
Roy, H. P.
Riddell, Jas.
Sootheran, L. G.
Spicer, P. O.
Stewart, N. C.
Thomas, C. G.
Trudeau, L. G.
Wade, M. L.

14th January, 1911.

Member:

Scott, Wm. F.

Associate Members:

Cavendish-Venn, G. W.
Cockburn, J. R.
Daniel, W. T.
Doncaster, P. E.
Earl, E. A.
Gallimard, Paul.
Harvie, T. W.
Haug, J. S.
Heenan, J. H.
Kilmer, J. H.
Lynn, L.
McPhee, M. N.
Milligan, J. C.
Morse, G. P.
Nelles, J. S.
Phipps, H. R.
Sutherland, A. A.
Zinck, K. J. C.
Jennings, P. J.

Associate:

McClellan, J. H.

Transferred from Associate Member to Member:

Dufresne, A. R. Tighe, J. L.

Transferred from Student to Member:

Whyte, J. S.

Transferred from Student to Associate Member:

Gillies, A. Laing, P. A.
Gransaull, P. R. Lavoie, E.

Students:

Buchard, E. R. Mignault, L. O'C.
Cummer, R. L. Milligan, F. S.
Dickson, G. H. Munson, A. H.
Gauvreau, J. R. Painchaud, R. L.
Hamel, E. Sutherland, C. C.
MacIsaac, D. F. Webb, C. E.

GENERAL.

Two volumes of *Transactions* were published during the year, namely, Volume II for 1909 and Volume I for 1910. There has also been published a Bulletin No. 6, giving notes as to elections and Society affairs, and in accordance with the instruction of the Annual Meeting, a pamphlet, "Standard Specifications for Cast-iron Water-pipe and Special Castings," has been distributed, as the report of the special committee appointed for the purpose.

The Council has named a Committee, under the chairmanship of Mr. C. N. Monsarrat, to prepare Standard Specifications for Steel Structures. While a considerable amount of work has been done, this Committee is not yet able to report finally.

At the last Annual Meeting the Council was instructed, on the request of the Quebec Branch, to take such steps as might be found advisable to secure an amendment to the Criminal Code in such a manner as to afford better protection to civil engineers in the discharge of their duties. The question having been referred to the Society's Solicitors, the Council, in view of their report, did not consider it advisable to take any steps.

The Council desires to point out that the resolution of the Annual Meeting of 1909, requiring that all reports of committees

should be submitted to Branches for consideration before final action, gives rise to many difficulties, and that it is unfortunately not practicable to carry the instruction into effect.

The five Branches of this Society have continued in active operation during the year. They now comprise a corporate membership of upwards of 400.

The reports of the various Committees of the Society have been published in a special pamphlet, distributed to the membership, and will be presented to this meeting for action.

H. N. RUTTAN,
President.

C. H. McLEOD,
Secretary.

Montreal, 15th January, 1911.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

During the year 1910 the following books have been presented and purchased. The sum of $39 has also been presented for the purchase of books:

BY PURCHASE.

"Corrosion of Iron and Steel." By Sang-Alfred. Linen D. pp. 100. New York, 1910.

"Corrosion and Preservation of Iron and Steel." By Cushman and Gardner. O. cl., Ill., pp. 300. New York and London, 1910.

"Hydraulic Turbines, their Design and Installation." By Gelpke-Viktor and Van Cleve, A. H. Sq. O. Cloth. Ill. pp. 288. New York and London.

"Illumination and Photometry." By W. E. Wickenden.

"Weingreen's Electric Power Plant Engineering."

"Internal Combustion Engines." By Hugo Guldner, translated by H. Dideriehs.

"The Great Lakes and the Ships that Plough Them."

"Highways of Progress." By J. J. Hill.

"Gibson's Hydraulics and its Applications."

"Hydraulics." By Johnson and Turneau. Two volumes.

"Testing Materials of Construction." By Unwin. (New edition).

"The Corrosion and Preservation of Iron and Steel." By Cushman and Gardner.

"Modern Methods of Water Purification." By John Don and John Chisholm.

"Treatise on Electricity and Magnetism." by Maxwell.

Presentations have been made by the following members:

Alexander, W., A. Can. Soc. C. E.
Barton, D. S., M. Can. Soc. C. E.
Brown, E. C., Stud. Can. Soc. C. E.
Coulas, L. L., Stud. Can. Soc. C. E.
Denis, V., A. M. Can. Soc. C. E.
Evans, A. E., A. M. Can. Soc. C. E.
Fay, F. H., M. Can. Soc. C. E.
Garner, A. C., A. M. Can. Soc. C. E.
Graham, W., M. Can. Soc. C. E.
Harvey, J. B., M. Can. Soc. C. E.
Hobbs, W. E., Stud. Can. Soc. C. E.
Mackenzie, H. A., A. M. Can. Soc. C. E.
Morrison, H. K., A. M. Can. Soc. C. E.
Robertson, W. D., A.M. Can. Soc. C.E.
Rubidge, W. F. B., Stud. Can. Soc. C. E.

Ross, R. W., Stud. Con. Soc. C. E.
St. Laurent, A., M. Can. Soc. C. E.
Scott, G., M. Can. Soc. C. E.

BOOKS PRESENTED.

"Filtration of Public Water Supplies." By Hazen, A. New York and London, 1908. 3rd Ed. Linen. O.
Presented by A. C. GARNER, A. M. Can. Soc. C. E.

"Report of the Cambridge Bridge Commission and Report of the Chief Engineer Upon the Construction of the Cambridge Bridge. Boston, 1909. pp. 363. Ill. Cl. O.
Presented by F. H. FAY, M. Can. Soc. C. E.

"Report Georgian Bay Canal, Dept. Pub. Works." Ottawa, 1908. Four book plates. Leather O.
Presented by A. ST. LAURENT, M. Can. Soc. C. E.

"Inspector's Handbook of Reinforced Concrete." By Ballinger, W. F., and Perrot, E. G. New York and London, 1909. pp. 63. Ill. Linen S. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"Designing and Detailing of Simple Steel Structures." By Morris, C. T., Columbus, Ohio, 1909, pp. 191, 1st Ed., linen O. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"Field Practice of Railway Location." By Beahan, Willard. New York, 1909, pp. 241. 2nd Ed. Ill. Cl. O. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"Bridge and Structural Design." By Thomson, W. Chase. New York and London, 1910. pp. 187. Ill. Linen. O. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"Railroad Curves and Earthwork." By Allen, C. Frank. New York and London, 1909. pp. 212. 4th Ed. Ill. Leather S. *Presented by* W. E. HOBBS, S. Can. Soc. C.E.

"Tables and Diagrams for Obtaining the Resisting Moments of Eccentric Riveted Connections." By Rexford, E. A. New York, 1909. Ill. 1-2 linen. Sq. R. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"The Slide Rule. A History of the Logarithmic Slide Rule and Allied Instruments." By Cajori, Florian. New York and London, 1909. pp. 126. 1st Ed. Ill. Linen, D. *Presented by* THE ENGINEERING NEWS PUB. CO., N.Y.

"Municipal Franchises: A description of the terms and conditions upon which private corporations enjoy special privileges in the streets of American Cities." By WILCOX, D. F. Rochester and New York, 1910. pp. 662. Vol. I. Cl. O.
Presented by THE ENGINEERING NEWS PUB. CO., N.Y.

"Concrete Steel Construction." By Morsch, Prof. Emil. Translated from the 3rd German Edition by Goodrich, E. P. New York and London, 1910. pp. 359. Ill. Linen. O.
Presented by THE ENGINEERING NEWS PUB. CO., N.Y.

"The Art of Roadmaking. Treating of the Various Problems and Operations in the Construction and Maintenance of Roads, Streets and Pavements." By HARWOOD FROST. New York and London, 1910. pp. 508. Ill. Cloth O.
Presented by THE ENGINEERING NEWS PUB. CO., N.Y.

"Pumping Engines for Water Works." By Hague, C. A. New York, 1907. pp. 363. Ill. Cl. O.
Presented by H. A. MACKENZIE, A. M. Can. Soc. C. E.

"Tunnel Shields and the Use of Compressed Air in Subaqueous Works." By Copperthwaite, W. C. London, 1906. pp. 384. Ill. Bds. O.
Presented by G. SCOTT, M. Can. Soc. C. E.

"Report of Minutes and Proceedings of the Advisory Board of Consulting Engineers." State of New York, *re* Barge Canal. Albany, 1910. pp. 252. Ill. Bds. O.
Presented by THE BOARD OF ENGINEERS.

"A Practical Treatise on Railroads and Interior Communication in General." By Wood, N. London, 1832. pp. 514. Ill. ½ leather O.
Presented by W. GRAHAM, M. Can. Soc. C. E.

"Report of the Royal Commission on Canals and Inland Navigation of the United Kingdom." Vol. I-VII, and Vol. IX. (N.B.—Vol. VIII. to come later). Ill. Unbound.

"Congrès International des Applications de l'électricité." Paris, 1909. Vols. I, II, III. Ill. Linen O.
Presented by THE CONGRESS.

"National Association of Cement Users' Proc., 5th Annual Convention." Cleveland, Ohio, 1909. pp. 547. Ill. Linen O.
Presented by THE ASSOCIATION.

"Report of the Board of Engineers on Deep Waterways between the Great Lakes and the Atlantic Tidewaters." Washington, 1910. Two Vol. (I and II), and maps. Ill. Linen Sq. O.
Presented by THE BOARD.

"Report of the Commissioners Appointed to Enquire into the Application of Iron to Railway Structures." (England). London. 1849. Half leather. F.
Presented by JOHN KENNEDY, Hon. M. Can. Soc. C. E.

"Electric Gas Lighting." By Norrie, H. S. S. linen. Ill. pp. 97. New York and London, 1906.
Presented by L. L. COULAS, S. Can. Soc. C. E.

"Les Eaux-de-Vie et Liqueurs." O. Cl. Ill. pp. 220. Paris, 1898.
Presented by DENIS, V., A. M. Can. Soc. C. E.

"Applied Statics." By Loudon, T. R. O. Cloth. pp. 164. Toronto, 1910.
Presented by W. F. B. RUBIDGE, S. Can. Soc. C. E.

"Water Power Engineering." By Mead, W. D. O. Cloth. Ill. pp. 757. 1st Ed. New York, 1908.
Presented by D. S. BARTON, M. Can. Soc. C. E.

The following is a complete list of periodicals, magazines, transactions, etc., regularly received and on file in the Library:

American Architect, *New York.*
American Machinist, *New York.*
*American Society of Civil Engineers, Transactions and Proceedings, *New York.*
*American Society of Mechanical Engineers, Transactions, *New York.*
*American Society for Testing Materials, *Philadelphia.*
American Institute of Architects, Quarterly Bulletin, *Washington.*
*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*
American Society of Engineering Contractors' Journal, *New York.*
*American Institute of Mining Engineers, Transactions, *Philadelphia.*
American Engineer and R. R. Journal, *New York.*
American Railway Engineering and Maintenance of Way Association, *Chicago.*
American Water Works Association.—Proceedings.
Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico.*
"Antonio Alzate" Scientific Society, Transactions, *Mexico.*
Association of Architects of Ontario, Annual Report, *Toronto.*
Association of Engineering Societies, Journal of, *New York.*
Association of Ontario Land Surveyors, Annual Report, *Toronto.*
Barge Cannel, Bulletin, *New York.*
Bibliographie des Sciences et de l'Industrie, *Paris.*
Board of Water Supply of the City of New York, *New York.*
Boston Public Library, Bulletin and Annual Report, *Boston.*
Boston Society of Civil Engineers, *Boston.*
Brooklyn Engineers' Club, Proceedings, *Brooklyn.*
Builders' Bulletin, *Montreal.*
Bureau of Standards, Bulletin, *Washington.*
Bureau of Mines, *Washington, D.C.*
Bureau of Mines, Report, *Toronto.*
Canadian Engineer, *Toronto.*
Canadian Electrical Association, *Toronto.*

Canadian Electrical News, *Toronto.*
Canadian Forestry Association, *Ottawa.*
*Canadian Institute, Transactions, *Toronto.*
Canadian Machinery and Manufacturing News, *Toronto.*
†Canadian Magazine, *Toronto.*
Canadian Manufacturer, *Toronto.*
Canadian Mining Institute, Transactions, *Montreal.*
Canadian Mining Journal, *Montreal* and *Toronto.*
Canadian Municipal Journal, *Montreal.*
Canadian Patent Office Record, *Ottawa.*
Carnegie Library of Pittsburg, *Pittsburg.*
Cassier's Magazine, *New York.*
Cement Record, *Kansas City, Mo.*
"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*
†Century, The, *New York.*
†Chambers' Journal, *London, Eng.*
Cleveland Engineering Society Journal and Transactions, *Cleveland.*
*Cleveland Institute of Engineers, Transactions, *Middlesborough.*
Colorado School of Mines, Bulletin, *Golden, Col.*
Construction, *Toronto.*
Contract Record, *Toronto.*
Cornell Civil Engineer, *Ithaca, N.Y.*
Crerar Library Reports, *Chicago.*
Department of Marine and Fisheries, *Ottawa.*
Department of Mines, *Ottawa.*
Department of Public Works, *Ottawa.*
Department of Railways and Canals, *Ottawa.*
Department of the Interior, *Ottawa.*
Electrical Engineer, *London, Eng.*
Electric Journal, *Pittsburg.*
†Electric Railway Journal, *New York.*
Electrical Review and Western Electrician, *Chicago.*
Electrical Review, *London, Eng.*
Electrical World and Engineer and American Electrician, *New York.*
*Engineers' Club of Philadelphia, Proceedings, *Philadelphia.*
Engineers' Club, *Toronto.*
*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineering Association of the South, Proceedings, *Nashville, Tenn.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*
Engineering-Contracting, *New York.*
Engineering Digest, *New York.*

*Engineering News, *New York.*
Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*
Engineering Standards Committee Reports, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Canada, Reports of, *Ottawa.*
Geological Survey of Ohio, *Columbus, Ohio.*
Geological Survey of Oklahoma, *Oklahoma.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
Harbour Commissioners' Report, *Montreal.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieurs,' *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Magazine, *Cleveland.*
Industrial Progress, *Milwaukee.*
Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*
*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Conciliation, *New York.*
International Waterways Commission, *Ottawa.*
†Iron Age, *New York.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumière Electrique, *Paris.*
La Technique Moderne, *Paris, France.*
*Liverpool Engineering Society, Transactions, *Liverpool.*
†London Magazine, *London.*
A Magyar Mernök-es Epitesz-Egylet, *Budapest.*
Machinery, *New York.*
Marine Review, *Cleveland, Ohio.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*
Mines and Minerals, *Scranton.*

*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Motor Car Journal, *London, Eng.*
Municipal Engineering, *Indianapolis.*
New Orleans Sewerage and Water Board, Report, *New Orleans.*
North of England Institute of Mining and Mechanical Engineers. *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle.*
Nova Scotia Institute of Science, *Halifax.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
†Power and the Engineer, *New York.*
Providence, City of, Annual Report, *Providence.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*
Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railroad Age Gazette, *Chicago.*
Railway and Marine World, *Toronto.*
Revista Technologico Industrial, *Barcelona.*
Royal Architectural Institute of Canada, Proceedings and Quarterly Bulletin, *Montreal.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng.*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*
Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*
Royal Institute of Engineers, Transactions, *The Hague.*
Royal Irish Academy, Transactions, *Dublin.*
School of Mines, Quarterly, Columbia College, *New York.*
†Scribner's, *New York.*
†Sketch, *London, Eng.*

Smithsonian Institution, Reports, *Washington.*
Société Scientifique Industrielle de Marseille, *Marseilles.*
Société Industrielle de l'Est, *Nancy, France.*
Société Industrielle du Nord de la France, *Lille, France.*
Société des Ingénieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
Technical Index, *London, Eng.*
Technology Review, *Boston.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Army, Corps Engineers—Professional Members, *Washington, D.C.*
U. S. Army—Report, Chief Engineer, *Washington, D.C.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*
Valve World.
Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*
Zeitschrift für Architecten u. Ingenieurwesen, *Hanover.*
Zeitschrift des Osterreichischen Ingenieur u. Architekten Vereines, *Vienna.*

University Publications:

Armour Institute of Technology, Year Book and Bulletin, *Chicago.*
Cornell University, President's Report, *Ithaca, N. Y.*
Dalhousie University, Calendar, *Halifax.*
McGill University Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal.*
University of Illinois, Bulletin, *Urbana, Ill.*
University of Toronto, Trans. Engineering Soc., *Toronto.*
University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

The following reprints and publications have also been received during the year:

Appalachian—Mills and Industrial Record, *Roanoke, Va.*, Jan., 1910.

The British Machinist and Patents, October and December, 1910.

City Engineer's Report, *Winnipeg, Man.*, 1909.

City Improvement League of Montreal, 1st Convention, 1910.

City Planning for Pittsburg, Civic Commission, 1910.

Commission of Conservation, Canada. 1st Annual Report, 1910.

University State of New York. Educ. Dept. Bulletins. Bibliography of New York State Library, 1909, and 23rd Annual Report of Library School.

The Pennsylvania State College—Engineering Experimental Station Bulletin 1, Vol. I.

Concrete and Constructional Engineering, Oct., 1910.

Tide Tables for Eastern Coasts of Canada, 1911.

Tide Tables for Pacific Coast of Canada, 1911.

U. S. Dept. of Agriculture, Farmers' Bulletin, 403, "The Construction of Concrete Fence Posts."

"The Waterworks of Monterey," Nuevo Leon, Mexico. Compiled by G. R. G. Conway, Chief Engineer.

"The Turbine Water Wheel as a Prime Mover," R. E. Horton.

"Grounded Electric Transmission and Electrolytic Corrosion," by J. Stanley Richmond.

"Compoundage des Alternateurs," by J. Dalémont and Louis A. Herdt. (Reprint Soc. Inter. des Electriciens.)

"Locomotive Headlights," by C. H. Benjamin. (Advance proof Western Ry. Club.)

The Monthly Official Railway List. (Nov., 1910.)

"Photographic Surveying," by Prof. S. W. Perrott, M. Can. Soc. C. E.

Those marked † are paid for; all the others are exchanges.

Those marked * are bound at the end of each year, and placed on the shelves in the General Reading Room.

The Committee is pleased to report that a large number of members avail themselves of the privileges of the Library and Reading Room of the Society.

The attention of members is again called to the arrangements under which books may be obtained on loan from the Library by making a deposit equal to the value of the book. By special resolution of the Council, this privilege has also been extended to non-resident members, conditional upon the borrower paying the cost of express charges.

R. S. LEA,

Montreal, 13th January, 1911. *Chairman.*

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1909

Receipts.

Subscriptions :—		
Arrears	$2,023 00	
Current	7,963 00	
Advance	376 00	
Entrance Fees	2,190 00	
		$12,552 00
Expense of Room to Railway Club		10 00
Interest :—		
On Bank balance	94 30	
On Overdue Fees	117 15	
		211 45
Sale of Transactions and Periodicals		24 60
Donations to Library		22 00
Dividends:—		
Can. Per. & West. Can. Mtg. Co. Stock	10 80	
Montreal Light, Heat & Power Co.	13 00	23 80
Total Receipts on Revenue Account		$12,843 85
Prize Fund :—		
Surplus from Summer Excursions and Interest		107 67
		$12,951 52
Balance from 1908		3,626 49
		$16,578 01

ERNEST MARCEAU,
Treasurer,

Montreal, January 14, 1910

Expenditure.

Transactions and Advance Proofs	$3,030 25	
Printing, Stationery, Binding and Diplomas	1,871 28	
Books, Magazines, and Library Expenses	178 61	
Postage, Post Cards, and Telegrams	710 59	
Salaries of Office Staff	3,482 15	
Caretaker's Wages	560 00	
Repairs and House Supplies	292 16	
Property and School Tax	205 15	
Water Rates	38 80	
Electric Light	267 87	
Coal and Wood	141 00	
Expenses, Annual Meeting	375 98	
Expenses, Ordinary Meetings	97 05	
Legal Expenses	89 96	
Examiners' Fees	100 00	
Students' Prizes	100 00	
Insurance	66 60	
Telephone	79 20	
Auditors' Fees	50 00	
Cabs, Cartage, etc.	3 15	
Gas for Cooking	25 70	
Bank Commission	29 94	
Sundry Expenses	120 95	
Messengers and Express	21 60	
Gzowski Medal	9 40	
Branch Societies—Toronto	102 00	
" Winnipeg	110 00	
" Ottawa	136 00	
" Vancouver	26 00	
Total Expenditure on Revenue Acct.		$12,321 39
Furniture and Permanent Fittings		110 00
Total Expenditure		$12,431 39
Balance in Bank, 31st December, 1909	$4,130 85	
Cash on hand	15 77	4,146 62
		$16,578 01

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.
Auditors

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1910

Receipts.

Subscriptions :—		
Arrears	$4,031 32	
Current	9,491 20	
Advance	133 60	
Entrance fees	2,124 00	
		$15,780 12
Expense of room to Railway Club		5 00
Interest :		
On Bank balance	97 11	
On Overdue fees	154 58	251 69
Sale of Transactions and Periodicals		42 10
Dividends—		
Can. Per. & West. Can. Mtg. Co. Stock	18 00	
Montreal Light, Heat & Power Co.	14 00	32 00
Total Receipts on Revenue Account		16,110 91
Cash Balance from 1909		4,146 62
		$20,257 53

Expenditure.

Transactions and Advance Proofs	$4,226 60	
Printing, Stationery, Binding and Diplomas	2,041 24	
Books, Magazines and Library Expenses	243 23	
Postage, Post Cards, and Telegrams	1,071 74	
Salaries of office staff	3,249 50	
Caretaker's Wages	595 00	
Repairs and House Supplies	137 67	
Property and School Tax	205 15	
Water Rates	38 80	
Electric Light	140 02	
Coal and Wood	116 34	
Gas for Cooking	25 90	
Expenses, Annual Meeting	456 31	
Expenses, Ordinary Meetings	86 90	
Legal Expenses	70 00	
Students' Prizes	50 00	
Insurance	10 00	
Telephone	89 70	
Auditors' Fees	50 00	
Cabs, Cartage, etc	3 00	
Bank Commission	30 35	
Sundry Expenses	36 70	
Messengers and Express	43 84	
Gzowski Medal	8 43	
Branch Societies—Toronto	172 00	
" Quebec	124 00	
" Winnipeg	75 00	
" Ottawa	252 00	
" Vancouver	25 00	
Total Expenditure on Revenue Acct.		$13,674 42
Prize Fund Account		
Over Credited from Detroit Trip 1909		21 35
Cash:		
Balance in Bank, 31st December 1910	6,545 55	
On hand	16 21	6,561 76
		$20,257 53

ERNEST MARCEAU,
Treasurer.

Montreal, January 13th, 1911.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1909.

Liabilities.			*Assets.*		
Surplus at 31st December, 1908	$30,418 10		Property No. 413 Dorchester Street W.		
Prize Fund Account	382 45		Balance at 31st December, 1908	$15,993 79	
	$30,800 55		Less 1 per cent. written off for depreciation	159 93	
Add					$15,833 86
Receipts on revenue acct. $12,843 85			Furniture—Balance at 31st Dec., 1908	1,714 77	
Less expenditure 12,321 39	522 46		Add additions during year	110 00	
		$31,323 01		1,824 77	
Less			Less 10 per cent. written off for depreciation	182 47	
Written off for depreciation—					1,642 30
Property account, 1 per cent.	159 93		Books—Estimated value		5,320 00
Furniture account, 10 per cent.	182 47		Arrears of Fees—estimated value		3,780 00
		342 40	Canada Permanent & Western Canada Mortgage Corporation Stock		180 00
		30,980 61	Montreal, Light, Heat, and Power Co. Stock		140 50
Add			Gold Medal		45 00
Additions to Prize Fund		107 67	Cash in Bank—		
			Bank of Montreal (Savings Account)	3,214 67	
			" " " (Current ")	426 06	
			Prize Fund, Bank of Montreal	143 47	
			" " Bank of Nova Scotia	346 65	
				4,130 85	
			On hand	15 77	
					4,146 62
		$31,088 28			$31,008 28

ERNEST MARCEAU,
Treasurer,
Montreal, January 14th, 1910.

Verified
RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1910

Liabilities				*Assets*			
Surplus at 31st Dec., 1909			$30,598 16	Property No. 413 Dorchester Street West			
Prize Fund Account at 31st Dec. 1909	490 12			Balance at 31st December, 1909	$15,833 86		
Less overcredited from Detroit trip in 1909	21 35		468 77	Less 1 per cent. written off for depreciation	170 00		
						$15,663 86	
Add Receipts on revenue acct.	$16,110 91			Furniture—Balance 31st Dec., 1909	1,642 30		
Less Expenditure	13,674 42		2,436 49	Less 10 per cent. written off for depreciation	164 23		
						1,478 07	
			33,503 42	Books—Estimated value		5,320 00	
Less				Arrears of Fees—estimated value		3,280 00	
Estimated Decrease in value of Arrears	500 00			Canada Permanent & Western Canada Morgage Corporation Stock		180 00	
Written off for depreciation—				Montreal Light, Heat, and Power Co Stock		140 50	
Property acct. 1 per cent		170 00		Gold Medal		45 00	
Furniture acct. 10 per cent		164 23	834 23	Cash :—			
				In Bank of Montreal, Savings Account	3,311 78		
				" " Current Account	3,233 77		
					6,545 55		
				On hand	16 21		
						6,561 76	
			$32,669 19			$32,669 19	

ERNEST MARCEAU,
Treasurer,

Montreal, January 13th 1911

Verified

RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

The statement accompanying this report is evidence of the healthy financial condition of the Society.

Attention is especially called to the amount ($4,031.32) of arrears collected, the largest in many years. The Secretary is to be congratulated on the remarkable success of his persistent, although, perhaps, unappreciated, labours in dunning members with short memories.

You will observe that our assets and liabilities have been estimated on the same basis as last year, and that 1% and 10% respectively have been written off our property and furniture. This is certainly very conservative, as the value of the former is taken this year at $15,663.86, as against $17,356.02 in 1902, in spite of the undeniable advance in property values on Dorchester Street. The fact is, we have been, from the beginning, deducting depreciation without ever adding anything for increase in value.

Our cash balance on the 31st December, 1910, was $6,561.76.

ERNEST MARCEAU,
Treasurer.

Montreal, 16th January, 1911.

Obituaries

OCTAVE CHANUTE, Hon. M. Can. Soc. C. E., was born in Paris, France, 18th February, 1832. He began work in civil engineering in 1849 on the construction of the Hudson River Railway, and was engaged on various railways in responsible positions until 1867. He was appointed chief engineer of the Missouri River Bridge at Kansas City on that date, and a year later was chief engineer in charge of the construction of four railways. In 1871 he became general superintendent of the Leavenworth, Lawrence and Galveston Railway, during which time three small towns in Kansas, located at the junction of this road, were consolidated, and, by a vote of the citizens, the new town was named Chanute. In 1873 he accepted the position of chief engineer of the Erie Railway, in which position he remained for ten years. During his tenure of this office many important improvements were made, and the Great Kinzua Viaduct was built under his direction. He was made assistant general superintendent of the Erie Railway in 1875. In 1884 he moved to Kansas City, and opened an office as consulting engineer. He was in charge of the construction of the iron bridges of the Chicago, Burlington, and North Western Railway, and of many other railway bridges. Five years later Mr. Chanute established himself in Chicago as a consulting engineer. Two lines of work with which he has been conspicuously identified are the preservation of timber and the development of aviation. He also organized the Chicago Tie Preserving Company. This business is at present carried on under the firm name of O. Chanute & Co. In addition to its commercial activities this Company has carried on much experimental and investigation work, and Mr. Chanute was universally recognized as a leading expert on the preservation of timber. In 1888 he undertook a number of experiments in connection with the science of aviation, and designed some aeroplanes known as the Chanute type. He published a book on "Progress in Flying Machines" in 1894, and in 1897 presented a paper on "Gliding Experiments" to the Western Society of Engineers. In 1909 he presented a paper to the same Society on "Recent Progress in Aviation." In addition to these writings, Mr. Chanute contributed a number of papers and discussions to the American Society of Civil Engineers. He was awarded a gold medal by the Aeronautical Society of Great Britain in recognition of his distinguished services in promoting the art of aviation. In 1905 the University of Illinois conferred upon him the degree of Doctor of Engineering.

Mr. Chanute was an Honorary Member of the Institution of Civil Engineers of England, of the Society of Civil Engineers of France, and of many other engineering societies. He was elected President of the American Society of Civil Engineers in 1891. He was elected an Honorary Member of this Society in 1907. He died November 23rd, 1910.

Z. J. Fowler, M. Can. Soc. C. E., was born at Newcastle, N.B., in 1850. He began his engineering career on the Intercolonial Railway at Newcastle in 1870, and was connected with that road until the autumn of 1874. In 1874 he accepted a position on the North Shore Railway (now C.P.Ry.) as resident engineer, and remained on that work until its completion. He returned to the Intercolonial Railway as engineer in charge of maintenance from Quebec to Moncton in 1886. He was for a time engineer on the Baie des Chaleurs Railway, and afterwards chief engineer of the Midland Railroad for several years. At a later period he lived in Ottawa, and became associated with M. J. O'Brien in engineering contracting. As a member of this firm he undertook contracts in Nova Scotia from 1900 to 1903, and afterwards at La Tuque, P.Q. Later he became a partner in O'Brien, Fowler & McDougall Bros. on contracts 19 and 20 of the Transcontinental Railway. He died in the autumn of 1910.

Charles Edward Goad, M. Can. Soc. C. E., was born in London in 1848. He came to Canada in 1869, and, after serving on the staffs of two Dominion railways, became in 1876 chief engineer of the Halifax and Cape Breton Railway. Subsequently he found it essential to the success of the system of insurance plans which he had inaugurated to give his whole time to the supervision of that work. These surveys now include all the important commercial areas in London, England; 55 of the principal cities and towns in the British Isles; several cities on the Continent of Europe, in the "Near East"; South Africa; the West Indies, and South America. In Canada over 1,300 places have been surveyed. In 1881 Mr. Goad founded in Montreal the publication *Insurance Society*, a paper which has developed into the present *Chronicle* (banking, insurance, and finance) of Montreal. Last year, while engaged on a survey at Valparaiso, Mr. Goad had a paralytic stroke, from which, however, he recovered, and returned to Toronto. He died at his home, 80 St. George Street, Toronto, after a second stroke on November 10th, 1910.

John Galt, M. Can. Soc. C. E., was born in Scotland, 23rd September, 1852. He studied at the University of Glasgow and King's College, London. After leaving college, he was assistant engineer for the contractors on the erection of buildings for the Glasgow and South Western and the Caledonian and North British Railways.

For several years he was a lecturer in the Government Science Schools, Glasgow. He was subsequently chief draftsman and assistant manager for an ironworks in Glasgow. Later he filled the office of chief draftsman for the Clarke Bridge Co., Baltimore. After coming to Canada, he was manager of the Boiler Inspection Co. of Canada, and subsequently established a general practice in engineering, chiefly along hydraulic and municipal lines. Amongst the more important works constructed under his direction, the following may be mentioned: A gravitation water supply for St. Johns, Newfoundland; Suburban Railway Electric Extension, east and west of Toronto; water works, sewers and electric light in the cities of Regina and Indian Head. He died at Vernon, B.C., on the 18th December, 1910.

Walter C. Kerr, M.Can. Soc. C. E., was born in St. Peter, Minn., U.S.A., in 1858. He was a graduate of Cornell University in the course of mechanical engineering, and was for some time an instructor and assistant professor in Sibley College, Cornell. After leaving the University in 1883 he assisted in organizing the firm of Westinghouse, Church, Kerr & Co., and was successively its secretary, treasurer, vice-president, and president. His greatest work was in organizing and perfecting through this concern co-operative engineering and constructive effort, and he took an active part in many of the most important engineering and constructive undertakings in the country, the last and most notable being the Pennsylvania terminal, now nearing completion in New York. He was much interested, as a trustee of Cornell University, in engineering education and in the development of all-round engineers. He was a Member of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the Franklin Institute, and the Engineers' Club of New York, the New York Railroad Club, and many others. On May 8th, 1910, at Rochester, Minn., he died of uræmia which developed while he was recovering from an operation for cancer.

George Masson, M. Can. Soc. C. E., was born January 27th, 1831, in Kingston, Ont., and was educated at Queen's University. In 1851 he entered the service of the Great Western Railway as chainman on preliminary surveys. In 1853 he was promoted to assistant engineer, and held that office until 1858. After leaving the service of the Great Western, he was continuously engaged as assistant and resident engineer on railway work for various companies until 1871, when he became chief engineer of the Detroit, Grand Haven, and Milwaukee Railway. From 1874 until 1876 he also held the office of chief

engineer for the London, Huron, and Bruce Railway, and in 1885 was appointed chief engineer of all Grand Trunk lines west of the St. Claire and Detroit Rivers. He filled the office of chief engineer for the Grand Trunk until the reorganization of the road in 1896, when the office of chief engineer of western lines was abolished. His services were, however, retained in a consulting capacity until his retirement in 1897. He died in the autumn of 1910.

George Charles Rainboth, M. Can. Soc. C. E., was born at Aylmer, Que., October 4th, 1846, and resided at that place during the greater portion of his life. He was educated at Ottawa College, and was a Dominion and Provincial Land Surveyor. During his long career as a land surveyor, he was engaged in work for the Dominion and Provincial Government, and carried out some important surveys for private individuals and corporations. He also engaged in general engineering practice, including some hydraulic and mining work. During the latter years of his life, he was in charge of the Canadian party engaged in delimiting the International Boundary between the Province of New Brunswick and the State of Maine. He died on November 2nd, 1910.

John Edward Schwitzer, M. Can. Soc. C. E., was born in Ottawa, 19th April, 1870. He was a graduate of McGill University with degree of B.A.Sc. in 1891. He began his engineering career as rodman on the Lake Temiskaming Railway, and in 1891 was assistant engineer on the location and construction of the Ottawa and Gatineau Valley Railway. In 1892 he was in engineering practice in Ottawa. From this date to 1896 he was assistant engineer on location and construction of the Parry Sound Railway and engineer in charge of a district on the Canada Atlantic Railway. From 1897 to 1899 he was in private practice at Kenora, during the latter year being also town engineer. From 1899 to 1901, he served as assistant and resident engineer on the Canadian Pacific Railway, first at Kenora and later at Winnipeg. After this date his promotion was very rapid. In 1903 he became division engineer on the central division; in August, 1905, principal assistant engineer for western lines, and in 1907 assistant chief engineer in charge of western lines, which position he filled until January, 1911, when he was appointed chief engineer of the Canadian Pacific Railway Company.

Mr. Schwitzer was intimately connected with the work of this Society, and was much interested in its progress. He was a Member of Council in 1908 and 1909, and at the time of his death was Vice-President elect. He was actively concerned in the formation of the Manitoba Branch of the Society, and was its Chairman during the year 1910. He died in Montreal on 26th January, 1911.

James Bruce Spence, M. Can. Soc. C. E., was born in Balmande, Scotland, in 1832, and came to Canada in 1857. He was an associate of Mr. Joseph Hobson and Mr. G. L. Reid in the construction of the Great Western Railway. In 1876 he was appointed on the engineers' staff of the Department of Railways and Canals, with which he continued to be actively engaged until his death. While Mr. Spence was charged with the design and construction of many of Canada's engineering works, he was especially concerned in the building of the Sault Ste. Marie Canal. He was chief draftsman of the Department of Railways and Canals at the time of his death, which occurred on May 20th, 1910.

Stanislas Gagne, A. M. Can. Soc. C. E., born in Chicoutimi, April 20th, 1879. Was educated at the School of Practical Science, Toronto, and graduated with honours in May, 1901. After graduation, he was for some time engaged in railway construction in British Columbia. In 1903 he was resident engineer in Toronto for the Toronto Power Co., under the late Mr. W. T. Jennings. More recently he was engaged in general engineering, and of recent years was head of the contracting firm of Gagne & Jennings. His death occurred near Chicoutimi as the result of an accident in April, 1910, in the construction of the Ha! Ha! Bay Railway.

Angus McMillan, A. M. Can. Soc. C. E., was born in Argyleshire, Scotland, 18th March, 1866. His father died when Angus was three years of age, and six years later his family moved to Glasgow. Mr. McMillan attended a public school in Glasgow until he attained the age of fourteen, when he emigrated with his family to Nebraska, U.S.A., and began his railroad career on the Burlington (B. and M.) Railroad. He afterwards served as county surveyor in Nebraska. In 1898 he was appointed instrumentman on the construction of the "Bull Dog" Tunnel on the Columbia and Western Railway, and has since then been continuously in the employ of the Canadian Pacific Railway as resident and locating engineer. He died of typhoid fever in Strathcona, Alberta, on October 11th, 1910.

Edward Charles Steele, A. M.Can. Soc. C. E., was born in Halifax, N.S., March 6th, 1869. He was educated in the School of Practical Science, Toronto. He began his professional career as a member of the engineering staff of the Carillon Canal in 1872, and remaining on that work two years. Between 1875 and 1880 he was employed on the engineering staff of the Canadian Pacific Railway, being chiefly engaged on construction between Winnipeg and Port Arthur. For a year he occupied the position of assistant engineer under Colonel Ruttan, Winnipeg. He was subsequently employed by the Manitoba Government in connection with river improvements. In 1882 he re-

turned to the service of the Canadian Pacific Railway, and was engaged in location work. Leaving that employ, he was assistant engineer for the Lake Erie and Detroit Railway. In later years he practiced as a Provincial and Dominion Land Surveyor.

GEORGE N. BAKER, S. Can. Soc. C. E., was born in Dartmouth, N.S., July 31st, 1878. He was educated at the Halifax Academy and King's College School of Engineering, Nova Scotia. His professional career was chiefly concerned with telephone work, and he was superintendent of construction for the Eastern Telegraph Company for some years.

DOUGLAS E. BLACK, S. Can Soc. C. E., was born in 1884, and was a native of Montreal. He was a graduate of McGill University in both mechanical and electrical engineering, having completed the latter course in 1907. In 1908 he entered the service of the Illinois Traction Company, and was shortly afterwards promoted to the position of assistant superintendent of motive power and equipment. He was killed in an electric car collision on the Illinois Traction system, near Staunton, Ill., on October 4th, 1910.

HEINRICH HERMANN BLISS, S. Can. Soc. C. E., was born in London, England, January 17th, 1886. He was educated in the Toronto Public and High Schools, and began his engineering work as a chainman on the Canadian Pacific Railway. He was promoted to transitman in the service of that road in September, 1907. At the time of his death he was in the employ of the Grand Trunk Railway at Toronto.

REPORTS OF COMMITTEES, JANUARY, 1911.

Report of Standing Committee on Portland Cement Specifications and Methods for Testing.

Mr. President and Members,

Canadian Society of Civil Engineers.

Gentlemen,

Since the presentation of the last Report and the adoption by the Society, at the last Annual Meeting, of the "Standard Methods of Testing and Specifications for Portland Cement," as recommended by your Committee, investigation and research on cement have been continued with promising results, but it is not deemed advisable to make changes in the specifications at present.

Your Committee has been advised by the Secretary of the American Society for Testing Materials that a new board of engineer officers of the United States army is being created for the purpose of working in conjunction with the Committees of the American Society of Civil Engineers and the American Society for Testing Materials, with a view to preparing a uniform "Specification and Standard Methods of Testing Cement." In the event of your Committee being requested to co-operate with the above, and it being the desire of the Society that they do so, we would recommend that the Society confer the necessary powers and provide funds to cover the necessary expense.

In reference to the expressed wish of the Society at the last Annual Meeting, that your Committee should investigate and report on the question of "Sand for Cement Mortar and Concrete," your Committee has accumulated considerable data, but is not yet prepared to make report on the subject.

Submitted on behalf of the Committee,

J. A. JAMIESON,

Chairman.

Committee.

J. A. Jamieson, *Chairman.*	C. E. W. Dodwell.
C. H. Rust.	Peter Gillespie.
W. P. Anderson.	J. S. Dennis.
D. MacPherson.	H. Holgate.

Report of Committee on Ties.

C. H. McLeod, Esq.,

Secretary, Canadian Society of Civil Engineers,

Montreal, P.Q.

Dear Sir,

I am enclosing you herewith Tie Committee's report, and beg leave to advise you that Messrs. W. B. MacKenzie and T. C. Burpee

have dissented from that part of the report about the use of 10' 6" ties. Mr. Holgate disapproves of the form, the subject matter, and the conclusions, but gives no reasons for doing so; presumably, he will give these reasons when the report is under discussion. Under these circumstances, I have not attached the names of these three members of the Committee to the report.

Yours truly,

D. MacPHERSON.

REPORT.

At the last Annual Meeting of the Society it was resolved—"That the Committee on Ties be continued, and that it confine its attention more particularly to the artificial preservation of ties, their size, and the timber best suited to the purpose."

Your Committee would beg leave to report as follows: In their report, presented to the Society in January, 1909, it was pointed out that some twelve million ties were being used annually in Canada, which number was being continuously and largely increased, so that probably, within the next 40 years, the consumption will be about one hundred and twenty millions, or equal to the present annual consumption in the United States.

Assuming the following data—average cost of untreated ties at point of shipment at 50c.; freight and putting in track, 15c.; total, 65c.; average life, 8 years. Initial cost of treated tie the same as above; cost of treatment, including extra handling, 25c.; total, 90c.; average life, 16 years. Then, if twelve million untreated ties are being used annually, and their average life is 8 years, there must be about ninety-six millions in use, and the capital necessary to place these ties in the track and provide for their renewal every 8 years, on a 4% basis, would be $2.41 per tie. The capital necessary to place treated ties in the track and provide for renewal every 16 years would be $1.93 per tie. The total capital necessary:

Ties.

= 96,000,000 × $2.41 = $231,360,000 for untreated ties.

96,000,000 × $1.93 = $185,280,000 for treated ties.

Total difference in capital.. $46,080,000

$46,000,000 at 4% = $1,843,200 = eventual annual saving.

As the cost of untreated ties and the numbers used are increasing very rapidly, and the cost of treatment is likely to be reduced, surely no more need be said to prove the urgent necessity of at once beginning the introduction of treated ties at all points where their capitalized values will show a fair saving on the investment, even if the question is only viewed from the standpoint of economy for the railways.

When the broader view of conserving our supplies, for fear of depletion, is considered, it assumes enormously greater importance.

Tie preservation by creosoting or otherwise has not hitherto received the attention it deserves in Canada, but it doubtless soon will, as the railway companies are becoming alive to this really vital subject. The American Railway Engineering and Maintenance of Way Association have, however, taken the matter up vigorously, and valuable information can be found in their *Proceedings*, vol. x, part 1, for 1909, and subsequent volumes. In co-operation with this Association, Purdue University made a series of tests to determine whether or not treatment of tie timber had any injurious effect on the strength of the material. The conclusions arrived at, from these tests, are briefly summarized as follows:

(1) No weakness was shown by treated ties, as compared with natural ties, either in rail-bearing or spike-holding strength, except in the case of ties treated with crude oil, and, even with that treatment, the weakening in rail-bearing was of a temporary character.

(2) The average stress under the rail at the elastic limit on the various woods was as follows: Red oak, 1,131 lbs. per sq. in.; short leaf pine, 642 lbs.; long leaf pine, 690 lbs.; red gum, 830 lbs.

(3) The extremes of atmospheric temperature have an appreciable effect on the strength of wood, especially when green. The warm timber was from 9% to 17% weaker than the very cold timber.

(4) The direct pulling resistance of common spikes in the various woods was as follows, in their natural state: Red oak, 7,639 lbs.; short leaf pine, 4,359; long leaf pine, 3,955; red gum, 3,883.

(5) The lateral resistance of common spikes in the various woods was as follows, loads at elastic limit, in lbs.: Red oak, 2,026; red gum, 1,704; long leaf pine, 1,650; short leaf pine, 1,619.

The lateral resistance of screw spikes depends on the diameter and length of shank under the head, elastic limit of the metal, and character of the wood.

(6) The screw spike had from 1.7 to 3.8 times the strength of the common spike against direct pull, and from 1.2 to 2.4 times the strength of the common spike against lateral resistance. The smaller screw spikes gave greater lateral and direct resistance per lb. of weight than the larger spike.

The strength of the common spike against withdrawal is increased when driven to follow a bored hole. The shape of the point of a common spike, however, leads it to drive out of a bored hole, and the resistance to withdrawal is thereby lowered.

A very interesting paper on the economic comparison of railway ties of different materials, written by Neil M. Campbell, appears in the *Engineering News* of September 22nd, 1910. The results are summed up in a table giving the order of merit of different kinds of wood treated by the three processes, zinc chloride, creosote, and Rueping, as compared with untreated ties, taking into consideration the first cost in the track and the average life.

Strange to say, the first in order of merit is untreated catalpa wood, but, as the writer does not give the value of treated ties of the same wood, this does not prove that it might not be still more valuable if treated.

The second in order of merit is cypress, also untreated, for which a life of 10 years is claimed, and initial cost in track 54c. The same wood, when treated with creosote, comes 19th in order of merit, having a life of 17.5 years and first cost of 95c. When treated by the Rueping process, the order of merit is 6, life 15 years, and cost in track 81c.

Oaks, untreated, come 30th in order of merit, 23rd when treated with zinc chloride, 15th when creosote is used.

Pine, when treated with creosote, comes 3rd in merit, 28th when zinc chloride is used, and 29th when untreated.

Tamarac, treated by the Rueping process, comes 10th in order of merit, but no mention is made of untreated tamarac or cedar. The table below will illustrate more clearly the comparative values of the woods above mentioned:

Material.	Treatment.	Average life, years	Cost in track	Capitalization 4 %	Annual cost	Order of Merit
Catalpa	None	20	0.60	1.104	0.044	1
Cypress	None	10	0.54	1.664	0.066	2
Cypress	Rueping	15	0.81	1.822	0.073	6
Cypress	Creosote	17.5	0.95	1.952	0.078	19
Pine	Creosote	15	0.75	1.687	0.067	3
Pine	Zinc Chloride	8	0.710	2.636	0.106	28
Pine	None	6	0.615	2.933	0.117	29
Tamarac	Rueping	15	0.81	1.822	0.073	10

From the foregoing it appears that, for the best results, different woods require different treatments. The Rueping process is a creosote treatment, and is fully described in the *Railway and Engineering Review* of October 15th, 1910. It differs from ordinary creosoting in that the timber is first put under air pressure sufficient to fill all the wood cells with air. The creosote fluid is then forced in at higher pressure, and the theory is that, after the greater pressure is released, the expansive force of the air throughout the interior of the timber will expel part of the fluid from the cells, leaving the walls of the cells painted with creosote instead of having the cells filled with it.

The cost of treating ties, of course, will vary largely, and will depend, to a great extent, on the numbers treated, the efficiency of the plant, and the nature of the treatment, but the Atchison, Topeka & Santa Fe Railway, who have used the Rueping creosote treatment pretty extensively, report that the cost of treating inferior pine ties is 20 cents.

Mr. Kelley, a member of your Committee, reports satisfactory personal experience with the Burnettizing process at a cost of from 15 to 20 cents.

With regard to size of ties, the 8′ length, 6″ to 7″ thick, with face from 6″ to 10″, is in most general use, but it is somewhat difficult to find any logical reason, other than initial cheapness, for adopting an 8′ tie for standard gauge track. As this length was adopted, and has been in use for such a long period, it is very easy to understand why the railway companies should hesitate to change, for the transition period would be both troublesome and costly. However, as the weights of rolling stock have more than doubled in the past 20 years, and steel rails have been increased in, roughly, the same proportion, it seems about time to make some correspondingly adequate change in tie dimensions.

It is true that the spacing of ties has been, of late years, made slightly closer, but, while the loads have been increased from 200% to 300%, the base of the superstructures to carry these loads, or the base area of the ties under a rail length, has been increased less than 50%. As there is a practical limit to close spacing of ties, on account of the difficulty of properly tamping them when spaced closer than 20″ centres, the only resource left is to lengthen them, if more supporting area is required.

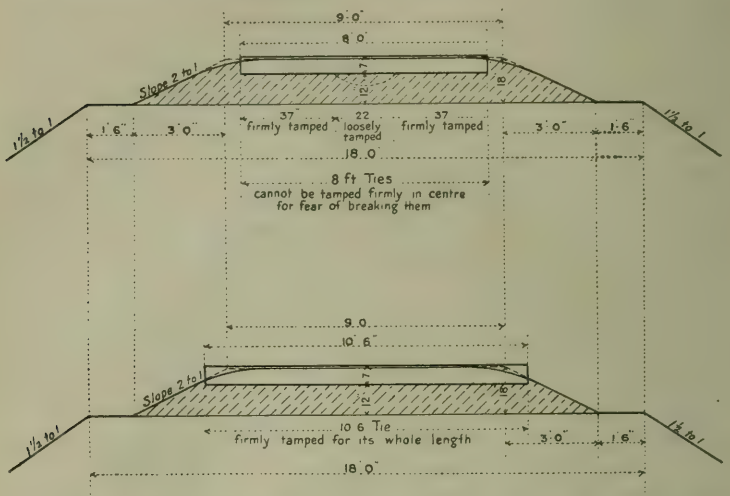
The 8′ tie, not only does not give sufficient support, but it is impossible to utilize its whole length for fear of breaking it, owing to the distribution of the loads on track of standard gauge.

The distance from the end of an 8′ tie to the outer edge of a 5″ rail base is about 16″, and the best practice is to firmly tamp such ties only 16″ from the rails each way. The reason for this is that, if fully tamped to the centre of the track, they would give a firmer support, in proportion to the load, at centre than at both ends, and the ties would break. In other words, you cannot utilize much more than 75% of the bearing capacity of such a length of tie under a standard gauge track, without destroying the tie itself. In order to utilize the full uniform supporting capacity of the tie for its whole length, it should have the same length from the centre of rail to end of tie, as from former point to centre of track, which would make it 10′ 8″—say 10′ 6″ long.

It is certain that even the best roads would hesitate to make such a radical change, and, of course, your Committee would not presume to say that they should make such a departure from long-established practice, but the fact remains that strong logical reasons can be given for the use of ties 10′ 6″ long, and such reasons cannot be given for the use of 8′ ties.

Ties 7″ thick, 10′ 6″ long, with 9″ face, would give about 70% increased support at an increased cost of only 31%. No increased width of ballast section would be necessary for the longer ties.

because no shoulder of ballast would be required at the ends of such ties, so that the actual yardage of ballast required would be slightly decreased by the increased space occupied by the ties. This is fully shown on the accompanying diagram, drawn to scale, illustrating how ties 10′ 6″ long may be used in an ordinary ballast section for 8′ ties, without requiring any extra ballast.



Note.—8′ ties tamped firmly for 16″ each way from rails only utilize the supporting area of 77% of tie, equal to 74″ in length, or 740 square inches for a tie of 10″ face.

10′ 6″ ties could be used in the same ballast section, firmly tamped for the whole length, giving the maximum supporting area of 1,260 square inches, or equal to 170% the efficiency of 8′ ties.

At the present average price of 50c. for 8′ ties, they cost about 36% of cost of 80 lb. rails and fastenings, which would only be increased to 42% by using the longer ties. The improved condition of track and saving in maintenance of rails and rolling stock would probably soon more than offset the difference in cost of ties.

It has been suggested that longer ties would make drainage more difficult, but, if good ballast is used, there would seem to be no difficulty in that regard, and if the ballast is inferior, the loose tamping under the centre of 8′ ties and the shoulder required at the ends of them would form pockets to retard drainage that would be obviated by the use of long ties. Your Committee would suggest experimental tests with ties 10′ 6″ long.

The best kinds of wood to use for ties depends upon so many

conditions of climate, availability, and cost of timber treated and untreated, that it is very difficult to make definite recommendations.

For general use in our Canadian climate, however, the following woods, if untreated and used with tie-plates, might be recommended, and they are given approximately in their order of merit, having regard to life and initial cost: Cedar, tamarac, oak, yellow pine, hemlock.

For treated ties, used also with tie-plates, the order of merit would be about as follows: Yellow pine, tamarac, hemlock, oak.

Respectfully submitted,

D. MACPHERSON,
Chairman.

COMMITTEE.

D. MacPherson, *Chairman.*
H. D. Lumsden.
F. P. Gutelius.
M. J. Haney.
Wm. McNab.
J. G. Sullivan.
H. A. Woods.
M. H. McLeod.
A. F. Stewart.
W. A. Bowden.
H. G. Kelley.

REPORT OF COMMITTEE ON ROADBED AND BALLASTING.

As per instructions to the Committee on Roadbed and Ballasting, it was hoped that we would be able to agree on modifications and omissions of the specifications on roadway as adopted by the American Railway Engineering and Maintenance of Way Association, so that a standard specification might be recommended to the Society.

After considerable correspondence, it was thought best not to recommend a specification this year. There have been some very good points brought out in correspondence, and we think it better that the Committee be given more time to carefully consider this very important matter, especially as we hope to be able to get a specification that will meet with the general approval of the majority of the Committee.

J. G. SULLIVAN,
Chairman.

REPORT OF THE COMMITTEE ON TRANSPORTATION ROUTES.

The Committee on Transportation Routes begs to report progress.

A preliminary report on the relative cost of construction, maintenance, and operation of the Georgian Bay Canal, St. Lawrence

Canals, and a Lake and Rail Route is in Course of preparation. A great deal of work has been done on it, and while it has been discussed and criticised by members of the Committee it has been found impossible to have it ready for presentation at this year's Annual Meeting.

W. F. TYE,
Chairman.

REPORT OF THE COMMITTEE ON RAILS, FASTENINGS, AND TIE-PLATES.

At the Annual Meeting two years ago your Committee on Rails, Fastenings, and Tie-Plates, presented drawings of the various sections of rail used as standard by the Railroads of Canada and the United States, and also of some sections which had been proposed and were then being placed in service experimentally.

At the last Annual meeting your Committee reported upon a standard drop testing machine, which received the approval of the Society, and which is now in universal use in the mills of both countries.

The experiments with the new sections have not progressed sufficiently for your Committee to present a statement of the results in this report, but the use of the new testing machine is proving most satisfactory, and is producing a uniformity of results in the physical tests at the different mills, which is of much value in the collation of statistics.

In considering the subjects for this year's report, it has seemed to your Committee, that the next logical step is to consider the service to which a rail is subjected, and the physical qualities requisite for such a rail, leaving for future investigations the consideration of how such physical qualities can be obtained.

With the increasing traffic of railroads, there followed naturally and of necessity an increase in car capacity and of engine weights. From a freight car weighing about 16,000 lbs., with a carrying capacity of 20,000 lbs., there came gradually an increase to cars having a carrying capacity of 40,000 lbs., 60,000 lbs., 80,000 lbs., and finally 100,000 lbs., with an allowable overload of 10%.

In this transition of car weight and capacity, it is interesting to note, that whereas the cars weighing 16,000 lbs., had a carrying capacity of 125% of their empty weight, that the cars of to-day carrying 100,000 lbs., with a maximum empty weight of 40,000 lbs., have a carrying capacity of 250% of their empty weight.

Freight cars having originally about 36,000 lbs., upon eight (8) wheels, or 4,500 lbs., per wheel, were superseded gradually by cars having, when overloaded 10%, 150,000 lbs., upon eight (8) wheels, or 18,667 lbs., per wheel. Engines having 12,000 lbs. per driving axle, or 6,000 lbs. per driving wheel, gave place to engines having 50,000 lbs. per axle, or 25,000 lbs. per driving wheel.

The original weight or rails varied from 35 lbs. to 45 lbs. per yard, but with the increasing weight of equipment the change was rapidly made to 56 lbs., 60 lbs., 65 lbs., 72 lbs., 80 lbs., and finally to as high as 100 lbs. per yard.

The effects of these heavy loads upon track having been investigated both theoretically by mathematical analysis and practically by carefully conducted tests upon the rail and track, under actual train movements.

Allowing 100% for the impact of rapidly moving trains over the standard track in use in this country, with engine axle loading of 50,000 lbs., we obtain the following, in which the third column would probably be more nearly the correct one theoretically, provided the stresses were due to the effect of the assumed load only.

	Fibre Stress per square inch (Tension).	
Weight of rail per yard	Between 3 ties as a continuous girder having stable supports.	Between 3 ties as a continuous girder having an unstable centre support.
60 lbs.	24,878 lbs.	28,000 lbs.
80 lbs.	16,668 lbs.	18,750 lbs.
100 lbs.	11,417 lbs.	12,842 lbs.

The stresses shown in column 3 do not reflect accurately the actual condition to which a rail may be subjected, for there is a reversion of stress of tension to compression like the swing of a pendulum under the passage of every wheel.

In addition, the rail is subjected to a continual series of shocks, due to imperfect counter-balancing of engines, flat spots on wheels, irregularity of track surface, the oscillation and jar of equipment, the tension due to contraction in a falling temperature, and the effect of the tractive force of the engines.

To determine the actual effect upon rails by passing trains, a series of careful experiments were conducted on the New York Central and Hudson River Railroad, with a delicate automatic

recording machine, by which the actual deformation of the rail could be measured for each passing wheel of a train, and the actual stresses in the rail determined.

These investigations demonstrated that at speeds of 30 to 40 miles per hour, engines having about 20,000 lbs. upon a driving wheel would produce tension stresses in the bottom flange of 80 lb. rails somewhere in excess of that shown in the third column of the preceding table, but well within the safe allowable limits of unit stress for good rail steel.

Experiments upon joints have also shown that a tensile stress of 12,000 lbs per sq. in. could be produced in the unloaded rail due to its contraction in a falling temperature, before the grip of the angle bars would permit the rail to slip and relieve itself.

An accumulation of these varied stresses in the lighter sections of rail, might therefore bring the total stress up close to the "Elastic Limit" or "Yield Point" of some of the rail steel.

The question has sometimes been asked, has the weight of the rail section increased as rapidly as the wheel loading? To this may be answered, Yes! In the days when a 60 lb. rail section was a common standard, an engine axle loading of 24,000 lbs. was not infrequent; this loading produced a tension in the rail under the conditions of column 3 of the table of 13,440 lbs. per sq. in., as compared with 12,842 lbs. per sq. in. for a 100 lb. rail, under an axle loading of 50,000 lbs.

From a study of the preceding conditions it is evident that certain physical characteristics must be secured, in a steel rail, to meet the requirements of modern transportation necessities; briefly these may be recalled as follows:

(1) The steel must be sound and free from physical defects.
(2) It must be sufficiently hard to resist abrasion reasonably and also deformation of section.
(3) It must be of uniform texture, tough, but not brittle.
(4) It must have a high limit of elasticity and ultimate tensile strength.

The question naturally arises, can such a rail steel be produced? The answer is, that it has been produced in the past, that it is produced to-day, although not uniformly, and therefore, that it should be produced uniformly in the future.

How to produce a rail steel uniformly possessing such qualities, and how to identify positively when such a steel has been produced, is a work, first, for the manufacturers, and second, for the manufacturers and users of rail jointly, and this knowledge must be the basis of a satisfactory specification in the future.

That such a result can be reached is earnestly to be hoped, but it will require the co-operation and serious endeavor of both interests to accomplish this most desired and necessary result.

Respectfully submitted,

HOWARD G. KELLEY,
Chairman.

REPORT OF THE COMMITTEE ON THE ESTABLISHMENT OF TESTING LABORATORIES.

The following letters from the Chairman of this Committee will serve to express the present position of the work which the Committee has in hand. The Committee consists of Mr. C. H. Keefer (Chairman), and Messrs. J. Galbraith, H. M. Mackay, J. A. Jamieson, P Gillespie, and G. E. Perley.

Ottawa, Ont., October 28th, 1910.

Professor C. H. McLeod,
Secretary, Canadian Society of Civil Engineers,
Montreal.

DEAR PROFESSOR MCLEOD,

I received your letter of the 17th instant, *re* Committee on the Establishment of Testing Laboratories, and delayed answering, as Mr. A. St. Laurent, Deputy Minister of Public Works, was out of town, and I thought it advisable to confer with him before taking action on the instructions of the Council to request the Dominion Government, on behalf of the Society, to make an appropriation of $100,000.00 towards the establishment of a Testing Laboratory, and also discussed the matter with Mr. George E. Perley, who is a member of the Committee. I afterwards, on the 26th instant, had an informal interview with the Minister of Public Works, the Hon. William Pugsley, and he advised that I should write him, as Chairman of the Committee, asking the Government to obtain full information as to the working, equipment, and cost of the United States Government Testing Laboratories, with a view to the establishment by the Canadian Government of one on similar lines, and that the matter would then be laid before his colleagues in the Cabinet.

The Minister seemed favourably disposed, and, I think, would detail an officer from his Department if the other members of the

Cabinet approve, to visit laboratories and obtain the necessary information. This can be done without a special appropriation, which would follow, should the Government decide to carry out the work.

Yours very truly,

C. H. KEEFER.

Metropolitan Building, Ottawa,
October 29th, 1910.

The Hon. William Pugsley,
Minister of Public Works,
Ottawa.

SIR,

On the 25th of May, 1909, I had the honour of waiting on you with a Committee of the Canadian Society of Civil Engineers, who were appointed to interview you with regard to the establishment by the Government of a Testing Laboratory for the investigation of structural and other materials. Following this interview, a letter was written on the 18th of June, 1909, signed by the President and Secretary of the Canadian Society of Civil Engineers, drawing attention to the benefit to the Government and the public at large which would result from the establishment by the Government of a fully equipped Laboratory on the lines of those which have been established by the American Government.

In view of the importance to the Government and the public of the information which can be obtained by the establishment of a Government Testing Laboratory for Canadian materials, I am writing to ask if you would detail one of the officers of your Department to visit laboratories established by the American Government, and obtain full information as to their working, equipment, and cost, so that a modified plan or estimate, to suit Canadian requirements, might be obtained for your information, should your Government think favourably of the establishment of a Canadian Testing Laboratory.

I have the honour to be, Sir,

Your obedient servant,

C. H. KEEFER,

Chairman Committee of the Canadian Society of Civil Engineers on Establishment of Government Testing Laboratories.

Ottawa, Ont., November 4th, 1910.

Professor C. H. McLeod,
Secretary, Canadian Society of Civil Engineers,
Montreal.

DEAR PROFESSOR MCLEOD.

I have received your letter of the 2nd instant, and enclose copy of letter I have written the Minister of Public Works *re* Establishment of Government Testing Laboratory.

I have written members of the Committee, enclosing copies of my letter to the Minister of Public Works, and expressed my own opinion to the other members of the Committee as follows:

"I think myself that we cannot, as a Society, do much more than this for the present. We have drawn the attention of the Government to the importance of the information that can be obtained to them and the public, and it rests with them to act on our suggestions. If you think well of it, we might report to Council to that effect, suggesting that we might individually try to interest members and Ministers on the establishment of a Government Testing Laboratory."

I hope to be able, after hearing from the other members of the Committee, to send a report to Council before the 12th instant.

Yours very truly,

C. H. KEEFER.

Ottawa, Ont., December 5th, 1910.

Professor C. H. McLeod,
Secretary, Canadian Society of Civil Engineers,
Montreal.

DEAR SIR,

The enclosed letter from the Assistant Deputy Minister of Public Works was received at my office during my absence. I am forwarding it for the information of Council as a supplement to the report of our Committee on Establishment of Testing Laboratories.

Yours very truly,

C. H. KEEFER,
Chairman.

Office of the Assistant Deputy Minister, Ottawa,
November 21st, 1910.

DEAR SIR,

I beg to acknowledge receipt of your letter of the 18th instant, enclosing copy of report of the Committee on Establishment of Testing Laboratories to the Canadian Society of Civil Engineers.

In this regard, after having discussed this matter with the head and deputy head of the Department, the importance of establishing

a Canadian Testing Laboratory, under the control of the Government, for the advancement of our technical knowledge in regard to all materials of construction, was recognized, and, as I could not spare the time to investigate the question myself, it has been arranged that Messrs. G. E. Perley and Arthur Surveyer, engineers in this Department, will proceed shortly to visit some of the Testing Laboratories in the United States, and collect data, in order that they may be able to present a joint report dealing fully with the question, as to equipment required, cost of suitable building, staff, cost of annual maintenance, etc. In drafting the report the co-operation of your Committee will be gladly accepted.

If at all possible, this report will be laid before the Honourable the Minister of Public Works, early during the coming winter, for his consideration.

Believe me,
Yours very sincerely,
A. ST. LAURENT,
Assistant Deputy Minister.

C. H. Keefer, Esq., C.E.,
Metropolitan Building,
49 Metcalfe Street, City.

Report of the Committee on Conservation.

In April, 1910, the Council of the Society, acting under the instruction of the Annual Meeting, appointed a Committee of twenty-two members, with the writer as Chairman. The Committee was constituted as follows, every Province of the Dominion being allotted two members, and the more populous provinces, Ontario and Quebec, two additional members each:

Representing Prince Edward Island..	J. B. Hegan, H. F. Laurence.
Representing Nova Scotia	C. E. W. Dodwell, R. McColl.
Representing New Brunswick	E. T. P. Shewen, M. G. Henniger.
Representing Northern Quebec	A. E. Doucet, R. O. Sweezey.
Representing Southern Quebec	R. S. Lea, J. M. Shanly.
Representing Northern Ontario	C. R. Coutlee, James White.

Representing Southern Ontario	W. H. Breithaupt, R. W. Leonard.
Representing Manitoba..	G. A. Bayne, E. E. Brydone-Jack.
Representing Saskatchewan	A. J. MacPherson, W. R. W. Parsons.
Representing Alberta	J. S. Dennis, John Chalmers.
Representing British Columbia	H. J. Cambie, T. H. Tracy.

Interest in the work was at once shown by several enquiries as to the duties involved and in regard to the work of the Committee and the method of procedure. The season however, was a busy one for the Chairman, and the matter was laid aside for a time.

Eventually a circular was formulated and sent out about the middle of November, which submitted the salient points involved in conservation. Members were requested to discuss the matter by writing short articles, and the answers so far received, on such short notice, are appended.

Briefly reviewed, the articles are as follows:

(1) From Mr. Breithaupt, Toronto, Ont., 1,200 words on the "Conservation of Water in the Basin of the Grand River, Western Ontario," which empties into the eastern part of Lake Erie. The drainage area is 2,600 square miles, length 160 miles, and fall 1,130′. The fall is 600′ in the upper 45 miles, or 13.3′ per mile, and 530′ in the remaining 115 miles, or 4.6′ per mile. The steep upper portion to Elora drains nearly one-third of the whole basin area on to a comparative flat above Preston, where a branch, the Speed, adds its quota off 300 square miles of steep country, falling 9′ per mile. The problem of preventing waste and gorging on this river, without lake areas, forms an interesting study in conservation. (See Appendix I.)

(2) From Mr. R. W. Leonard, 900 words and an extract from an address on "The Scope of Engineering in Canada," made at Toronto University, November last, 600 words.

Under the head of forests, a widened railway right-of-way of 400′ is mentioned as a preventative to forest firing by locomotives, and the Temiskaming and Northern Ontario practice of wide clearing is cited.

The enormously enhanced cost of sawn lumber is exemplified by actual examples of dimension timber bought 23 years ago for $4.50 per thousand on cars, and bought 19 years ago for $7.50 on cars.

For the benefit of intending manufacturers, published records of the quantity of all raw materials gathered, manufactured, or exported would be very desirable.

Minerals are said to be better left to private exploitation, despite the national method in Norway. Precautions against accidents are carefully attended to in Canada, but individuals are responsible for their own safety, and cannot be supervised in a wild and extensive territory.

The difficulty of extracting marketable products from the ores of Northern Ontario is great, but a reduction plant has been designed and put into operation at Thorold, Ont. That Canada, the sole producer of nickel and cobalt, should lose the wages, experience, and profit of refining them is regrettable, especially as the foreign-finished products, such as nickel anodes and commercial cobalt and arsenic are imported by Canadian manufacturers. An American refinery of Canadian nickel employs 2,000 people, who might as well be living in Canada. The mineral production of Canada in 1909 was over $90,000,000—nine times what it was in 1886.

Water powers are mainly confined to the Niagara district, where nearly half a million horse-power is developed. The average cost of a horse-power is $25 per year per 24-hour service, compared with $50 for gas engine and $75 to $150 per year for steam. An example of the improvement in transmission in 1893 is given. At that time a 12-mile line was not possible, while to-day high pressure (110,000 volts) makes possible a 200 mile conveyance. (See Appendix II.)

(3) From Mr. McColl, 700 words on "Water Powers in Nova Scotia." The rivers emptying into Northumberland Strait have small power value, as also the rivers of Cape Breton, except the Margaree River. The granite formation along the south shore and Bay of Fundy holds as usual many lakes, and the outlet streams furnish numerous small powers. The powers developed are listed, and also promising ones not yet developed. The former amount to 12,000 h.p. and the latter to 30,000 h.p. Storage dams are required, and are possible on many of these rivers. Powers belong to owners of land on each side of the rivers. (See Appendix III.)

(4) From Mr. Sweezey, 900 words regarding "Forests and Water Powers." The greatest danger to standing timber is fire, which, largely, is started by carelessness of settlers. Reforestation is really necessary, as the self-seeding of pine is very slow and uncertain. Wider railway clearings are advised, from which stumps, debris, and grass should be cleared, and the blocking out of forests from lake to lake by wide fire guards is suggested. (See Appendix IV.)

(5) See also letter from Mr. Bayne (Appendix V).

It will be seen that the papers so far received deal principally with mining, water power, and forests, but Mr. Leonard touches a very important matter as to the lay-out of new towns. So far, nothing has been received concerning lands, game preservation, or fire loss in cities, but it is hoped that members will later on discuss some of these matters.

General statistics are not readily obtained by our members, and it is suggested that Provincial and Federal Departments should be asked by Council to place members of this Committee upon their mailing lists.

It may be said that informal discussions have been had with several members, which were most interesting, but which, unfortunately, have not been committed to paper. The whole subject is only becoming understood, but the trained observation of engineers will in a couple of years lead to a definite programme regarding several matters.

This year's work is submitted to Council with the hope that a resolution favouring wider railway space will be forwarded to the Commission on Conservation, and also one favouring the dressing up of all rivers having 1,000 square miles drainage area into reaches. The refining of minerals at home is also worthy of constant promotion.

C. R. COUTLEE,
Chairman.

APPENDIX I.

(Report of Committee on Conservation.)

Mr. W. H. Breithaupt on Water Conservation, Grand River, Ontario Peninsula.

One of the most important of natural resources is water, falling as rain and snow, from which result ground water and stream flow. Unlike mines, which are exhausted and cannot be replaced, and forests, which are, practically, also exhausted, or at least take a very long time to replace, this natural resource is perennial.

Conservation of water is the continuing of natural conditions in the drainage area, or the establishing of artificial conditions, which tend to equalize the flow of streams throughout the year. Natural conditions are: a forest cover, which keeps the ground open and permeable and retards snow melting; lakes, which act as reservoirs; and swamps, which act both in retarding snow melting and as spongy reservoirs. Reforestation of the headwater areas of the watershed and the construction of large storage reservoirs to hold flood waters, to be let down as required, are artificial means of water conservation.

The south-western part of the Province of Ontario, a peninsula surrounded by large bodies of fresh water—Lake Huron, with

Georgian Bay, Lake Erie, and the western end of Lake Ontario—is the most southerly part of the Dominion of Canada. In climate, in fertility of soil, in density of population, and in agricultural and manufacturing activity it equals, if not excels, any other similar area in Canada. In topography the peninsula presents a high plateau near its northern limit. The slopes are steep toward the north and east, but more gradual toward the west. They are at first steep, then gradual, and become flat toward the south-west and south. This area was originally, up to 100 years ago, covered with a heavy growth of fine timber, pine and hardwoods, and large swamps. The forests have practically disappeared, and the swamps have been cleared and drained, so that, as far as records show, less than 12% of the whole area now remains in forestation or original swamp.

Precipitation records have been kept at lake points, and to some extent in the interior, for the past sixty years, covering the period of deforestation. Rainfall and snow appear not to have decreased with deforestation. This is accounted for by the unique condition of large surrounding bodies of fresh water. The prevailing winds from the west and north-west, after traversing a stretch of almost 500 miles of water, and so becoming saturated with moisture, strike the rising ground on the westerly slope, are deflected into colder strata, and rain or snowfall results. There is large snowfall particularly on the head plateau, some records showing as much as 130" in a winter, and many above 100".

This somewhat convex plateau, the headwater area of the peninsula, was originally for the greater part covered with a dense, heavily-wooded swamp. Precipitation in this area appears to be from 35 to 40 inches of water per annum. On it, or near it, rise practically all the larger rivers of the peninsula: the Nattawasaga, Beaver, and Sydenham Rivers to the north; the Saugeen and Maitland to the west; the Thames to the south-west; and the Grand River to the south. The original condition of the headwater area, that of an excellent natural reservoir, the best that could have been contrived for maintenance of ground water and equalizing of stream flow, existed to a large extent until about 30 or 35 years ago. Since then this great natural resource, which could to such far-reaching benefit have been preserved, has been practically destroyed, by settlement, clearing and drainage of the land, with the result that streams, which formerly had a well-sustained flow throughout the year, now, with rapid snow-melting and run-off, have great floods, followed by an extremely small flow.

Typical of the rivers of the Ontario peninsula, and perhaps the most important of them, is the Grand River. Its watershed, wide at headwater area and narrowing further down, comprises about 2,600 square miles. Its source is at an elevation above sea-level of 1,700', its outlet into Lake Erie at elevation 572. Its tributaries are, in

their order from upstream, the Conestogo from the west, the Speed from the east, and the Nith from the west. In topography and flow characteristics the river may be divided into two parts, the upper river above the outlet of the Speed tributary, and the lower river below that point. On the upper river the low waterflow is less than one-half of 1% of the flood flow; on the lower river, low water is less than 1% of flood. Extreme low water periods occur during July, August, and September, and often in mid-winter.

Developed water powers on the main river are at Fergus and Elora on the upper river, now almost worthless during low water, and at Galt, Paris, Brantford, Caledonia, and Dunnville on the lower river. These water powers make use of the following heads:

Fergus .. .. ..12 to 14' (information not accurate).
Elora .. ..Two developments—at falls, 18 to 42', depending on backwater; at upper dam, 12'.
Galt.... .. .. ..8½'.
Paris .. ..14'.
Brantford .. ...Two developments, 32' and 16'.
Caledonia .. ...7'.
Dunnville .. ...6' 8".

There are some considerable powers at Guelph, and a number of smaller developments of water power on the tributaries.

While restoration of the headwater area to original swamp condition would not be impossible, and it is by no means proved that this would, with time, be uneconomical, at least 300 square miles, and preferably more, would have to be considered to have proper effect. This would involve very large outlay and comparatively slow return. Conservation by storage is more practicable, and for this the immediate river valley at several places above the outlet of the Conestogo River tributary appears to give good facility. Storage would also be practicable, probably, on the Conestogo and Nith. A total dischargeable capacity of 2½ to 3 billion cubic feet would, it is estimated, serve to prevent flood excess and to give continuous minimum flow, in addition to the present minimum, of 300 to 400 cubic feet per second. What this would mean in power gain alone, on existing developments, is easily computed from the heads given.

Flood control and water power gain would be far from the sum of benefit to be obtained by proper conservation of the waters of the river.

There is no topographical survey of the Grand River watershed. The data given are from individual reports and published records, from county and general maps, and from the writer's personal observations. An approximate contour map, giving elevations, will be found in White's "Dictionary of Altitudes in Canada."

APPENDIX II.

(Report of Committee on Conservation.)

R. W. Leonard.

In answer to your circular letter, I beg to enclose a few statements and opinions under the headings outlined by yourself.

Forests.—I approve of your suggestion that a much greater width should not only be permitted but enforced on railways constructed through forests that are liable to burn. Probably 400′ would not be too great, as evidenced by the example set along these lines in the clearing of the right-of-way for the T. & N.O. Railway. This railway has been cleared for a width of several hundred feet, brush and rubbish burned, and no doubt the result has been the saving of large values which would otherwise have been destroyed in fires.

In this connection, I was much impressed, during a recent hunting trip in the north country, by seeing the enormous amount of work done by the beavers, which, having been protected for a number of years, have increased enormously in numbers, with the result that they have flooded every old beaver-meadow, and have raised the water in all the small lakes and many of the smaller streams from 2 to 4′, both in the Province of Ontario and in Quebec. This must have a very important effect in checking forest fires, and also in regulating the flow of water in the streams during the dry season.

Minerals.—The exploitation and development of the mineral wealth of the country must necessarily be left to private enterprise, aided by wise legislation and facilities for transportation.

Regarding the safety of life, my experience leads me to the belief that in Canada this important matter, both in coal and in metal mining, is looked after as carefully as perhaps in any other country. It is impossible, however, to make intelligent comparisons between large, well-established industries, such as coal and iron mining, and small mines being developed necessarily under the supervision of a couple of partners, who are responsible for their own safety, and over whom it is impossible, and perhaps unwise, to exercise too great Government supervision.

The economical method of extraction of minerals is surely of greater importance to the owners than to the Government, and might safely be left in their care.

Canada is practically the sole possessor of the ores of nickel and cobalt that are commercially valuable to-day. These are mined, and either exported in the raw state to foreign countries, or they receive a preliminary smelting treatment in Canada, and the products are exported for further treatment and refining in foreign countries.

The Coniagas Mines has established at Thorold the Coniagas Reduction Company, for the smelting and refining of its own ores,

though it supplements this supply by small purchases of ore from other mines.

These reduction works cover an area of about 4 acres of ground, represent an investment of about $500,000 capital, employ an average of about 125 men, with a pay-roll of $100,000 per year, and spend about as much more for supplies, stores, chemicals, etc., largely purchased in this country, and all for the treatment of the ore of practically one mine.

If one were to estimate the population which would be supported by the employees of metallurgical works to smelt and refine in Canada all the products of the nickel and cobalt mines of Ontario, it would be found to amount to an astonishing figure, and if this industry could be kept in Canada, the result would be of enormous benefit to the country.

With the present tariff arrangements this is impracticable, however, as the United States get these ores and partially treated products free of duty, and charge a prohibitive tariff against the finished articles. They then refine the crude products, and prevent competition in Canada, for even the small market which it offers, by returning the products duty free.

Wisely arranged tariffs would result in a greater conservation of mineral resources for the benefit of Canada than any other line of endeavour that is apparent to me.

I am informed by a man thoroughly conversant with the subject that one company engaged in the refining of Canadian nickel ores at Constable Hook, near New York, employs 2,000 men. The wages of these men, the expenditure for fuel, acids, and various other chemicals required in the process, the employees that would be required to produce these chemicals in Canada or in the enlargement of the industries already producing them, the money expended in transportation of these commodities, the farming community that these employees would support, and their regular quota of tradesmen, business men, and professional men, would support a population of well over 40,000 souls, and, from personal knowledge, I am convinced that, apart from the artificial restrictions imposed by the United States tariff, this district of Ontario would be better suited for that industry than Constable Hook.

These remarks apply to *one* nickel industry only, and I have no doubt my estimate could be multiplied by two if Canada would force all this refining to be done in her own borders.

Waters.—My notes under the head of "Forests" apply under this head also, as the connection between forest growth and the conservation of our lakes and rivers is too intimate to be separated.

The water powers in this district are chiefly at Niagara Falls; the Canadian Niagara Power Company, the Toronto Niagara Power Company, and the Ontario Power Company, are all too well known

to require description. At Niagara Falls there is also a power of about 5,000 h.p., developed some 15 years ago for the operation of the Niagara Falls Park & River Railway Company. At Power Glen, about three miles south of St. Catharines, the Hamilton Cataract Power, Light & Traction Company enlarged their old plant some eight years ago to a capacity of about 30,000 h.p., under a head of 267'.

There are a large number of small powers along the old Welland Canal, which are utilized for the operation of various pulp and paper mills, flour mills, knitting mills, etc.

Public Health.—One of the greatest elements of danger to public health is the rapid increase of population in new centres in our north country, forming small towns, which rapidly grow into important centres of population and are organized as towns, and shortly afterwards as cities under the Municipal Act.

The men who seek public positions in these towns are universally men who are interested in land speculation and in the selling of liquor legally or illegally. These men are always elected to office because they seek it for the profit they may get indirectly in prosecuting their peculiar business.

The result is that such towns are always badly administered, wastefully managed, and public health is absolutely neglected until typhoid breaks out and becomes epidemic, and spreads throughout the Province and other parts of the Dominion.

In my opinion there is only one way to correct these conditions, that is, by preventing such men from holding office, and this can only be done by refusing incorporation to these centres of population, and the governing of them by a commission appointed by the Provincial authorities until such time as the "boom" is over and the municipalities have settled down to the ordinary business which is responsible for their existence.

From personal knowledge, I know that the epidemics of typhoid at Fort William and at Cobalt were the result of conditions outlined above, and under any reasonable government these epidemics should never have occurred.

Extract from Address of R. W. Leonard at Toronto University, November, 1910.

"The mineral production of Canada in 1886 was $10,221,255; 1896, $22,474,256; 1906, $79,057,308; 1909, $90,415,763, or $12 per capita, as against $2.23 per capita in 1886—and we have just begun.

"Northern Ontario and Quebec have scarcely been glanced at as yet by the prospectors, yet you are all familiar with the fact that

Ontario produces the bulk of the world's nickel and about 12% of the world's silver, and much of its corundum and mica. Quebec produces most of the world's asbestos.

"Our prairies and British Columbia contain the coal that is essential for the existence of the population flowing in there, and for the Northwestern United States.

"We have many hundred miles of the same rocky mountains that have produced all the fabulous wealth in silver, gold, and copper in South America, Mexico, and the Western United States. In Canada the development of these undoubted mineral resources is comparatively slow, owing to climatic conditions in winter and the general distribution of forest growth arising from the moister climate—meaning so much greater things for the ultimate welfare of the country.

"Here we see forest growth and forestry entering into the domain of engineering, and raising the question of how nearly allied is the science of forestry and the conservation of other natural resources to our profession. Here are a few figures which may help measure our problem by: In 1887 I built a large coal-loading wharf in Nova Scotia, the hemlock timber for which cost $4.50 per 1,000′ B.M., sawn in bridge sizes and loaded on cars. It had been cut down for the tan bark; a part of what would otherwise have rotted in the woods was utilized for the wharf. The present price of such timber there would probably be $20 per 1,000′. About 1891, in Parry Sound district, white pine, hewn to railway bridge sizes, was delivered at the site of the structures for $7.50 per 1,000′ B.M. During the past two years nearly all the timber of the same sizes required for the mining buildings in Cobalt has been brought from British Columbia at a cost of about $27 per 1,000′.

"The 'inexhaustible' pine forests of Canada are of the past, as our other forests will shortly be if we do not take extraordinary precautions towards conserving and replanting them.

"Coincident with the increased cost of timber, we find a decrease in the cost of Portland cement, which is rapidly taking the place of timber in many structures.

"When reinforced with steel, we get a most important building material, the proper use of which is an art almost worthy of forming a separate branch of civil engineering.

"In water power development Canada ranks almost first, with nearly a half million horse-power developed or being developed in the Niagara district alone. Consider the value of this to the territory served by this power by comparing its cost at, say, an average of $25 per horse-power per year for 24-hour service to the consumer, as against the cheapest other available power, the gas engine, at, say, $50 per year, or the steam engine at any price from $75 per year to $150 per horse-power per year.

"In 1893 I had charge of the construction of a very large (at that time) hydro-electro plant at Niagara Falls, Ontario, for the Park & River Railway Company. We developed 2,000 horse-power, and the best electrical authorities advised that it was cheaper to put in and operate a steam engine and generator at Queenston to operate cars on that grade, 12 miles from the power-house at the Falls, than to convey the current from the main power-house. It was put in and operated for some years. Now we see that same power being carried a couple of hundred miles at 110,000 volts. Have we reached the limit?"

APPENDIX III.

(Report of Committee on Conservation.)

Mr. R. McColl on Water Powers in Nova Scotia.

Speaking generally, the streams on the northern coast of Nova Scotia flowing into Northumberland Strait, in the counties of Pictou, Colchester, and Antigonish, have so little fall, except up near their source, where the watershed is very limited in extent, that their commercial value for power purposes is small. There are practically no lakes for storage purposes in this region, so that streams flowing into the Northumberland Strait through these counties are hardly worth considering as regards water power.

In the Island of Cape Breton the lakes are not numerous, Lake Ainslie being the only one of considerable size, and while there are some heavy falls on some of the streams, as a rule, where the falls are heavy, the area of the watershed is so small as to prevent them having any great commercial value except for a few months during the freshet season. Consequently, there has been no development of water powers in the counties of Pictou, Cumberland, Antigonish, or the four counties in Cape Breton. The Margaree River, flowing out of Lake Ainslie, would probably furnish 1,000 horse power or more, but I am unable to state whether this could be done advantageously from a commercial standpoint.

The southern shore of Nova Scotia and also the Bay of Fundy shore, including the counties of Guysborough, Halifax, Lunenburg, Queen's, Shelburne, Yarmouth, Digby, Annapolis, King's, and Hants, are studded with lakes, and while there are no very great water powers, there is scarcely a stream which would not provide a small power.

The following towns in the Province are lighted from hydro-electric plants, most of them owned by the municipality: Mahone, Lunenburg, Bridgewater, Liverpool, Annapolis, Bear River, Bridgetown, and plans are under way for the lighting of Yarmouth and Wolfville.

With the exception of the town of Liverpool, where from 600 to 800 horse-power is developed, probably none of these powers have a

capacity of more than 250 horse-power. Besides these lighting plants, the number of water-powers that have already been developed in the Province are as follows:

Rapid Falls Pulp Mill, Liverpool	3,000 H.P.
Cowies Falls Pulp Mill, Liverpool River	1,500 H.P.
Mill Village Pulp Mill, Medway River	1,800 H.P.
New Germany Pulp Mill, LaHave River	1,500 H.P.
Harmony Pulp Mill, Medway River	1,000 H.P.
Sissiboo Pulp Mill, Sissiboo River Digby County	2,000 H.P.
Yarmouth Power Company, Tusket River	500 H.P.
St. Croix Pulp and Paper Company	1,000 H.P.

The following are a number of undeveloped powers:

Mersey River, 120′ head	10,000 H.P.
Gasperaux River, 350′ head	5,000 H.P.
Medway River, 60′ head	3,000 H.P.
Clyde River	1,500 H.P.
Bear River, 85′ head	1,100 H.P.
Bear River, 120′ head	1,500 H.P.
St. Croix	1,500 H.P.
Liscombe	1,000 H.P.
Tusket	2,500 H.P.
West River, Sheet Harbour, 60′ head	800 H.P.
East River, Sheet Harbour, 30′ head	600 H.P.
Rocky Mountain, East River, St. Mary's, 90′ head	800 H.P.
Tangier	400 H.P.
Musquodoboit	800 H.P.

The above has been calculated from my personal knowledge of the area of the watersheds and the actual fall, and certainly comprise all the principal powers in the Province. There are, however, probably a larger number of smaller powers, from 600 down, which I have not included in this list.

The amount of power given is the average yearly power that could be developed. Of course, without storage, a great deal of this would go to waste during freshets, and the power that could be developed during the two or three dry months would in many cases not be more than 25% of this amount. There is an excellent chance for storage in our two greatest power rivers—namely, the Mersey and the Gasperaux Rivers. In the case of the Mersey, a dam has been built for storage purposes at the mouth of Lake Rossignol, which stores water over 28 square miles, thus enabling a continuous flow of water to be had almost the whole season. In the same way a dam could be placed at the mouth of the Gasperaux Lake, which would give an even flow for the whole year. Most of the rivers mentioned have fair-sized lakes, but probably none of them, with

the exception of the St. Croix, are capable commercially of having storage dams put in to enable them to have more than 50% of their estimated power continuously developed during the whole year.

Practically all the water powers in the Province are owned in fee simple, the powers belonging to the parties who purchase the land on each side of the river.

APPENDIX IV.

(Report of Committee on Conservation.)

Mr. R. O. Sweezey on Conservation in the Province of Quebec.

In accordance with your request, I beg to submit the following notes on some conservation problems.

Naturally, the members of this Committee must plead a lack of time for considering the questions that arise in a conservation policy. It might, however, be suggested to engineers that they make notes as ideas occur to them for the betterment of conditions affecting conservation. Such observations, when the time comes to expound theories and weld them into practical recommendations, will be something definite to present the Committee.

If there is anything to criticise in our country's policy of conservation at this early stage, it is perhaps the too great tendency to dwell on the wonders of our great national assets, with the result that the execution of detail, which in this as in every other great work is the vital part of a do-something policy, is bereft of that enthusiasm which has prevailed in the discussion of the generalities.

Forests.—First, last, and always we must consider fire as the worst enemy of the forest.

Railroad companies are fast realizing their responsibilities, fire ranging systems are slowly but surely improving, travellers and prospectors are being educated and watched, and the law is preparing to punish negligence.

But it is plainly evident that the regulations, or at any rate the enforcement of them, as affecting fires started by settlers in land clearings, are as far behind present requirements as it is possible to be. Settlers are allowed to start their fires just where and when they please. While some exercise intelligence and care, it is a deplorable fact that most of them show little concern as to the spreading of their fires towards the uninhabited bush.

Why is it that Governments have not regular field forces employed to burn the settlers "slashings" for land clearing? Or, at least, why are settlers not required to pile their "abatis" sufficiently far away, and to have the intervening space sufficiently clean, to prevent any possibility of fire spreading to the standing bush?

Reforestation.—While any policy of reforestation may seem absurd for Canadians to consider at the present stage, it is well to remember that there is very little pine left in our eastern forests.

Since pine seeds only at an advanced age, and since the seeds do not scatter themselves very far from the parent tree, when nearly all the large or old pine trees are cut, where will the seed come from to provide a new growth of this valuable timber? We are now cutting the younger trees before they produce seed, and so the chances for new pine forests are becoming more remote.

The burnt areas, where very thin strata of soil overlie the archaen formations, might well be considered good ground for experiment in reforesting before such areas are completely denuded.

Water Powers.—In the matter of conservation of water powers, attention might be drawn to the practice of locating railroads too close to the banks in river valleys. This condition is exemplified by the location of the National Transcontinental Railway along the steep banks of the St. Maurice River above La Tuque. This location, besides subjecting the railway to heavy damage by spring floods, has destroyed the feasibility of developing some of the finest water powers in the Province.

Attached is a list of water powers of this Province which are owned by private parties or corporations. Also an incomplete list of water powers in remote places which will probably soon be opened to development.

Water Powers of Importance on the North Shore
(below Saguenay River).

Natashkwan River	20,000 H.P.
Romaine River (Mingan Seigniory)	40,000 H.P.
Magpie River	10,000 H.P.
St. Jean River	6,000 H.P.
Manicouagan River	250,000 H.P.
Portneuf	4,000 H.P.
Bersimis	5,000 H.P.
Outard	10,000 H.P.
	345,00 H.P.

St. Maurice River (above La Tuque)	40,000 H.P.
Nottaway River (within 40 miles of T.C. Ry.)	40,000 H.P.
Natagagen River (within 40 miles of T.C. Ry.)	20,000 H.P.
Harricanaw River (within 40 miles of T.C. Ry.)	40,000 H.P.

East Main, Rupert, and other large rivers falling into James Bay are too far north to be of any value at present.

WATER POWERS IN THE PROVINCE OF QUEBEC

DESCRIPTION	Available Horse Power	Use	Developed Horse Power	REMARKS
Grand' Mere Falls	66,000	Laurentide Pulp Co.		
Great Bastonnais River (Champlain Co., Malhiot Tp.)				
Maskinongé River, Ste. Ursule Falls	4,000			
Lac Onareau River (Montcalm Co., Rawdon Tp.) Darwin and Manchester Falls	4,700			
Ottawa River, Quinze Rapids from lower chutes.	26,200	Bronson Co.		
Brewery Creek	500	City of Hull		
Chats	No power	Improvement Co.		Used for years
Chats	No power	Improvement Co.		Used for years
Chaudiere Falls		Hull Power Co.		
Chats Rapids	7,650			
Chats Rapids	5,700	Improvement Co.		Lumber slide
Chats Rapids	1,570	Pontiac Gold Co.		
Gatineau River (Crow rapids) Maniwaki	1,650	Electric Co.		
Chelsea	2,700	Gilmour & Hughson		Used for years
(Tp. Hull)	10,000	Gilmour & Hughson		Used for years
Paugan Falls	27,000			
Desert River (Lytton Tp.)	300			Used for years
Riv. du Lievre, Buckingham		Lumber Co.		Used for 50 years
High Falls	34,600	McLaren Lumber Co.		
Little Blanche (Pontiac Co., Duhamel Tp.)				
North River, (St. Jerome Tp.)				
St. Lawrence River, Lachine Rapids	21,600	Lachine Hydraulic		Used for years
Chateauguay River, Godmanchester				Used for years
Lake St. Francis, Hungry Bay	No power			Intake to St. Louis river
Chaudiere River (Jersey Tp.)	3,400			In operation
St. Francis River, Bull Head Falls	2,300			
Magog (Ascot Tp.)	1,360			
Richelieu River, Rouville Co	1,000	Mo. L. H. & P.		
Chambly	3,400			

WATER POWERS IN THE PROVINCE OF QUEBEC

DESCRIPTION	Available Horse Power	Use	Developed Horse Power	REMARKS
Magdalen River (Gaspé Co., Denone Tp.)	6,000	.....	.....	.....
Little Cascapedia (Bonaventure Co.)	2,000	Lumber Co.	.....	.....
Marguerite River (North shore, 2 Ids) two falls and bed	.....	J. Clarke	.....	Clarke built
Pentecôte River (North shore) all bed. ..... River in River (North shore) all bed.....	10,000	.....	.....	$110,000 spent Oct. 1906
Great Trinity River (North shore) bed 10 miles up..	.....	Mosson Co.	.....	.....
Little Trinity River, bed 10 miles up.....	.....	Mosson Co.	.....	....
Manikuagan, North shore Saguenay Co.) first falls.	331,456	.....	.....	Annual rent, 99 years
Sault au Cochon River, North shore (Saguenay Co.) three falls 1 mile up	2,000	.....	.....	Annual rent, 99 years
Saguenay River, Grand discharge.....	Part of 375,000	.....	.....	.....
Saguenay River, Grand discharge.....	Part of 375,000	....	.....	.....
Little discharge.....	662	.....	.....	Used for years as flour mill
Carons Falls.....	130,000	.....	.....	.....
Ha! Ha! River (Chicoutimi Co., Bagot Tp.)..	625	Electric Co.	.....	.....
Metabetchouan River.....	1,330	Pulp Co.	.....	.....
White Falls	.....	.....	.....	.....
Cascade Falls.....	1,350	Pulp Co.	.....	.....
Rapids	1,200	Pulp Co.	.....	.....
Peribonka River, White Falls	.....	Pulp Co.	.....	..... .
Dolbean Falls.....	.....	.....	.....	Used for years
Manuan River (Champlain Co.) falls 4½ miles up)..	1,000	.....	.....	Annual rent, 99 years
Chicoutimi River (Chicoutimi Tp.).....	.....	Price Bros.	.. ....	Used 60 years
(Jonquieres Tp.).....	17,600	Pulp Co.	.....	.....
Falls and islands.....	.....	El. Light Co.	.....	.....
River au Sable (Chicoutimi Co.).....	1,000	Jonquieres Pulp Co.	.....	.....
Rapids	.....	.....	.....	.....
Ste. Anne River (Portneuf Co., Gaspard Tp.).....	.....	.....	.....	.....
Portneuf Co..... .	426	.....	.....	Used for years
St. Maurice River (Radnor Tp.).....	.....	Can. Furnace Co.	.....	.....
(Malhiot Tp.).....	50,000	.....	.....	.....
Rapid des Hêtres.....	1,400	Shawinigan Power Co.	.....	.....
Des Grés power.....	.....	.....	.....	Used for years
Shawinigan Falls.....	100,000	.....	30,000	.....

APPENDIX V.

(Report of Committee on Conservation.)

Winnipeg, December 14th, 1910.

C. R. Coutlee, Esq.,
Convener of Committee on Conservation,

SIR,

Your circular of the 15th of November to hand and carefully noted. The subjects referred to are so broad and numerous that it would be impossible to do them anything like justice in any limited space. However, I have thought it well to refer to one or two of the most important matters that will, in the natural course of events, come up for solution shortly in the Dominion.

First, the water powers of the West, which are as yet comparatively unknown, are not only numerous, but valuable. The country lying south of the Saskatchewan River is fairly well explored, and the value of the water powers in the Winnipeg, Saskatchewan, and Assiniboine Rivers are at least known quantities. The Winnipeg River is in course of development, but the Athabasca, McKenzie, Nelson, Churchill, and Bow Rivers, and other streams leading from the mountains eastward, are, as far as the general public is concerned, unknown quantities. It seems to me that the Dominion or Provincial Governments should have all rivers affording water powers surveyed and measured, and have the information obtained classified. Also that no streams should have all the water power alienated from the Crown, and all leases should be for actual development, and not for exploitation, and in such leases provision should be made that the public should get the benefit of the development at a fair interest on capital invested.

Secondly, coal mines. Coal is found in all the Provinces, but the best of it lies in the Province of Alberta. The mines in Manitoba and Saskatchewan have a soft lignite coal which answers well for heating purposes, but which has no value for steam purposes. The tendency in the West seems to be for wealthy companies to purchase all the coal in a given neighbourhood, and only develop a sufficient quantity to meet the demand at a high price to the consumer. Were the undeveloped areas the property of the public, they could be mined at a profitable income on the capital invested and the cost of coal to the consumer greatly reduced. As wood for fuel in the prairie district is almost, even at the present time, used up, the marketing of coal for fuel will before long become a very important question, and it seems to me that the Conservation Committee could well devote some of its energies to the question of supply and demand of coal, both from development and transportation points of view.

Thirdly, the loss to the country by prairie and forest fires is also something that can be greatly reduced. Carelessness of travellers

has started many fires on our prairies and in the bush. The unguarded state of the right-of-way of railways is also a prolific source of danger. Unless the locomotives are compelled to use spark arrestors, all the precautions taken by the farmers on each side of the track are of little use, as a fire starting on the right-of-way of a railway would soon find its way out to the surrounding country through unused land held by speculators or through vacant Government land.

Fourthly, the pollution of our rivers by sewage has also become a matter of great moment, and I am pleased to see that the different health boards are now making a great effort to have the practice abolished.

The tendency of the country is to permit capitalists to so control our natural resources as to utilize only such portion of them as will yield large returns on their investments.

Your obedient servant,

GEORGE A. BAYNE.

REPORT OF COMMITTEE ON SEWAGE DISPOSAL, ETC.

The Committee appointed at the annual meeting of the Canadian Society of Civil Engineers held at Ottawa in January, 1910, to investigate and report on the question of " Sewage Disposal with reference to the Pollution of Lakes and Streams in Canada," begs to report as follows:

The rivers and streams of a country are the natural drainage channels into which all of the rainfall, not directly evaporated or taken up by plant growth, must ultimately find its way. A portion of it sinks into the ground and reaches the streams in the generally pure form of springs or seepage through their beds or banks. The remainder flows directly into them over the surface, and naturally and inevitably carries with it a considerable quantity of polluting matter, the character of which will depend upon the nature of the drainage area and density of the population.

The surface drainage from an uninhabited watershed will not generally cause any dangerous pollution, but may add to the color and turbidity of the water to an extent as to make it more or less objectionable for domestic purposes. Streams, however, rising in mountainous or other wild unsettled districts usually furnish good and wholesome water near the source of their supply; but where they pass through populated districts, devoted to farming and other industries, they receive from their banks, and from tributary brooks and rivulets, the drainage from farm yards, dairies, dwellings,

manured land, and finally the sewage of villages and towns. Much of the objectionable drainage from country districts is more or less purified by natural processes, but on the other hand a considerable proportion often reaches the streams direct. That this is often highly dangerous in character has been demonstrated in several instances, as at Lowell, Mass. This city, which obtains its water supply from the Merrimac River, was visited in the autumn of 1890 by an unusually severe epidemic of typhoid fever. By careful investigation this was traced to an infection of the river water by a few cases of typhoid fever on a small brook which entered it about three miles above the water works intake.

It is impossible, or at least impracticable, to prevent pollution of this kind except in the case of streams with very limited watersheds, where the conditions may be made subject to control. In this connection it is interesting to note the case of Liverpool, England. The water supply is obtained from a stream rising in the mountains of Wales, the watershed of which is owned or controlled by the city. This circumstance is not, however, depended upon to ensure the entire safety of the water, which is filtered through slow sand filters before being delivered to the consumers.

So far as the subject of this report is concerned, the pollution of lakes and streams referred to applies particularly to that produced by large isolated institutions, industrial establishments, etc., or by cities and towns provided with systems of sewers and drains. It, therefore, does not deal with all source of pollution, but rather is confined to those cases in which impurities are added, in comparatively large quantities, to water which is already more or less impure. It is important that this should be borne in mind when considering the general question of sewage disposal, and the degree of purification which may be deemed practicable or indispensable.

The necessity for the purification of sewage may be considered from two points of view, first, with regard to the organic matter which it contains, and, second, with regard to its germ content. The inevitable fate of the organic matter is to pass through certain processes of decomposition and oxidation whereby it is untimately reduced to harmless mineral forms. Under natural conditions, this may cause nuisances and conditions offensive to the senses. The main object of sewage disposal, as at present understood and practised, is to prevent this, and to cause the oxidation changes to take place under controllable conditions, quickly, inoffensively, and to such a degree as will at least produce a stable effluent, incapable of undergoing further changes of an objectionable character. All modern methods of treatment are capable of accomplishing this, but without greatly diminishing the number of bacteria present in the raw sewage, where they often occur to the extent of several millions per cubic centimeter. Among them are to be

found large numbers of germs from the intestines of man and the lower animals, and these usually include specific germs of disease.

Sewerage Systems.

Sewerage systems may be either *combined* or *separate*, that is, there may be a single system to carry both the domestic sewage and the street drainage; or the domestic sewage and the street drainage may be kept separate and carried by a system of sanitary sewers and a set of storm water drains. During heavy storms combined sewers will necessarily have to discharge a volume many times greater than the dry weather flow, often fifty times or more. It is, therefore, obviously impracticable to attempt to purify more than a small percentage of the storm water discharge. The English Local Government Board requires sewage disposal plants for systems of this kind to have a capacity necessary to provide for six times the dry weather flow. Anything beyond this is discharged without treatment.

This storm overflow is nothing but diluted sewage. The first washings of the streets often contain as much organic matter as sewage itself; and the sewage at such times is particularly foul on account of the dry weather deposits and accumulations of filth being flushed out by the greatly increased flow.

Detailed descriptions of the principles of sewage purification, and the different methods by which it may be accomplished, are given in the various published works on that subject. It will be convenient, however, at this point to refer briefly to these methods and to mention a few sewage disposal plants now in operation which illustrate the different processes.

Early Methods of Sewage Disposal.

With the introduction of really efficient systems of sewerage, which has taken place almost entirely within the last fifty years, the first and most obvious method of disposal was to turn the sewage into the nearest body of water. Incidentally, it may be stated that this is still the practice in the majority of cases in every country with the exception of England. There, the density of the population, the great number of large manufacturing cities, and the small size of the rivers, soon combined to produce conditions which urgently demanded some measures of relief. The first method employed was Broad Irrigation, or Sewage Farming. The results obtained were in many cases fairly satisfactory, but the difficulty in obtaining the required areas of suitable land, and certain objections from a sanitary standpoint have led to a gradual restriction in their use, and even to their abandonment in Birmingham and several other places.

Many other systems involving chemical treatment of the sewage

were attempted, but generally with indifferent success in the way of real purification. The example of England was followed to some extent in other parts of Europe and in the United States. In the latter country intermittent filtration through prepared beds of underdrained sand and gravel has been used with great success in some of the Eastern States where the natural conditions are favourable.

Generally, however, there has been little development until within the last twelve or fifteen years. During this period the newer methods of sewage disposal, or the so-called "biological processes," have been more fully studied and developed, and are now being almost universally adopted.

Modern Methods of Sewage Disposal.

These may be said to consist in a general way of two processes, viz.: (1) the separation of the greater part of the suspended matter or sludge, and (2) the oxidation of the remainder and of the organic matter in solution, in artificially prepared beds or filters. The first, or sedimentation process, is accomplished by screening the sewage and passing it through sedimentation, chemical precipitation, and septic tanks, and the deep tanks of the Hampton and Imhoff types.

In the second or oxidation process, there are two general methods employed, viz.: Contact Beds or Percolating Beds. These beds are commonly called filters, though the process is not one of filtration.

Contact Beds are briefly watertight basins, 4 or 5 feet in depth, filled with crushed clinker, coke, coal, broken stone, screened gravel, or any hard substance, broken to the proper size, which is usually from ¼" to 1½". The tank effluent is applied to the beds by means of overflowing grooves and troughs and through open jointed pipes. When the bed is filled to within a few inches of the surface, the inflow is stopped and the bed is held full for two or three hours. Next, the effluent valves are opened, allowing the beds to empty slowly and the interstices to fill with air. The beds are then allowed to remain empty for a time, when the entire process is repeated. The time of a complete cycle thus includes the periods of filling, resting full, emptying, and resting empty. Ordinarily, there are three such cycles in twenty-four hours. The beds are usually operated in groups, and the valves are opened and closed at the proper times by automatic devices. In many cases it is necessary to pass the effluent from the first contact beds through a second set.

Percolating Beds are sometimes referred to as Trickling or Sprinkling Beds or Filters. In this instance the materials used are the same as in contact beds, but usually of larger size. The walls need not be watertight, their purpose being merely to support the material of the bed. They are usually from 6′ to 8′ deep. The sewage is distributed over the surface of the beds in the form of

a spray from jets placed at regular intervals, or from travelling distributors usually operated by power. The operation is continuous, the sewage trickling through the material of the bed and carrying the air down with it. The concrete floor of the bed is provided with a system of underdrains through which the effluent discharges.

Efficiency of the Different Processes.

The degree of purification effected by the different methods referred to may be briefly stated as follows:

Sewage Farming.—Where sufficient areas of well drained suitable soil are available, the effluents are usually nonputrescent and often of a comparatively high degree of purity. The percentage reduction of bacteria is also satisfactory both with respect to the total number and to Bacillus Coli, which is a representative intestinal germ. In many cases, however, where there is careless management, over dosing, and a non-porous subsoil, the purification is inferior and the effluent contains large numbers of bacteria.

Intermittent Filtration.—Under favourable conditions this is the most efficient of all processes, the effluents being uniformly nonputrescent and the bacterial contents comparatively low, usually less than 10,000 per c.c. These results are not, however, always attained in practice, especially during the winter and early spring.

Contact Beds.—Treatment by single contact effects a moderate degree of purification, but a second treatment is generally necessary to secure a non-putrescible effluent. The removal of bacteria is imperfect, the effluent frequently containing a million or more per cubic centimeter.

Percolating Filters.—The purification effected by this process is superior to that obtained by double contact. The effluent is ordinarily non-putrescent, but at intervals it contains an unusually large proportion of suspended matter. When the removal of this is necessary it can be readily provided for by small sedimentation basins. The percentage reduction in bacteria is higher than with contact beds, but is still so low as to be of little importance from a sanitary standpoint.

From the experience of the last few years with contact beds and percolating filters on a working scale, and from the results of several series of experiments carried out in the United States, Germany, France, and England, the concensus of opinion seems to be in favour of the percolating filter, and this is the process which is now being adopted in the majority of cases both in the United States and Europe. Manifestly the operation of either system during the winter season in cold climates will be attended with special difficulties. Two contact bed installations, one for the sewage of Macdonald

College at Ste. Anne de Bellevue, and the other for a small district in Toronto, are reported to be working satisfactorily; and at least two percolating filters are being built in connection with institutions in Quebec.

In the colder parts of Canada no demonstration has yet been made of their possibilities, though several plants are contemplated, or are already in course of construction in Saskatchewan and Alberta.

Dunbar, a German authority on sewage disposal, states that "the object of sewage disposal may be briefly described as an attempt to preserve our rivers in a natural condition, to guard them against visible pollution, and to prevent danger to the health of those living near them."

These requirements can be fulfilled under all circumstances by methods described above. To what degree purification should be carried out, or whether it is necessary at all, will depend on local circumstances, each case requiring separate consideration. In large rivers such as the Ottawa and the St. Lawrence, the raw sewage of even large cities can be discharged without sensibly offensive results. The dilution is so great that the organic matter soon disappears under the action of natural processes of purification. The same is, in general, true of large lakes, where the sewage is discharged a sufficient distance from the shore. Where, however, the stream or lake is small and the volume of sewage discharged is relatively large, one or other of the complete processes must be employed, which will produce a non-putrescible effluent. In England, where the conditions are most unfavourable, this is practically the universal requirement; and the same may be said of Germany, France, and the United States.

When the water of a river or lake is to be used for domestic purposes, the aspect of the case is entirely changed. The presence of intestinal bacteria, which cause typhoid and other diseases, undoubtedly constitutes a menace to health; and while their tendency is to die, and eventually disappear, they may persist in sufficient numbers to render the water dangerous for drinking purposes for long distances from the point of discharge. Modern sewage disposal methods cannot be depended upon to entirely prevent such contamination. Unavoidable pollution of the same nature from storm overflows from country districts, has already been discussed. Hence the only feasible method of securing complete protection for surface water supplies would seem to be the filtration of the water by the towns and cities using it. In Germany this is required by law for all surface supplies.

There may, however, be special circumstances such as the close proximity of a sewage outfall to a waterworks intake, which would

render the filtration of the water unusually difficult or expensive; or where, as in the case of Baltimore, a shellfish industry is threatened. In such cases treatment for the purpose of disinfecting the effluent, or the removal of the bacteria, should, if possible, be employed. The latter can be accomplished to a great extent by filtration through sand. Disinfection of effluents and even of raw sewage, by various chemicals, has been practiced in emergencies for some time, but the high cost of the materials, and the large quantities employed, formerly rendered it generally prohibitive on the score of expense. But within the last four or five years, experiments by Rideal, in England, and Phelps and others in the United States, have shown that filter effluents can be sterilized to the extent ot destroying practically all the harmful bacteria by the use of chloride of lime or bleaching powder, and at an estimated cost of from $1.50 to $3.00 per million gallons of sewage. Tank effluents and even raw sewage can also be sterilized but at a considerably greater cost. Plants of this kind are contemplated for several places in the Atlantic States where the circumstances warrant their necessity.

It should, however, be observed that it is difficult to obtain complete sterilization in this way even with filter effluents, because the effect of the chemical is limited to the surface of lumps of suspended matter, even though these lumps are of almost microscopic size.

Conditions in Canada.

Coming now from the general foregoing survey of the subject to consider more particularly the conditions in Canada, we find that with its large lakes and rivers, and its relatively small population, it has so far suffered less from inadequate methods of sewage disposal than most countries. For the purpose of obtaining definite information, a list of questions was sent to all places with populations of 1,000 or over. These questions with the answers are appended to this report (Appendix I.).

The list was sent to 327 places in all, and replies were received from 166, distributed by provinces as follows:

Province.	Questions Sent.	Replies Received.
Prince Edward Island	2	0
Nova Scotia	34	20
New Brunswick	15	9
Quebec	40	24
Ontario	164	80
Manitoba	17	9
Saskatchewan	12	5
Alberta	20	10
British Columbia	23	9

The replies may be briefly summarized where necessary as follows:

Question 1. 64 places report combined systems, 38 separate, and 64 none at all.

Question 2. Of those reporting from the Maritime Provinces, the discharge in every case but one is into the sea coast harbours or tidal estuaries unfit for domestic water supplies.

Quebec reports 8 discharging into the fresh water portions of the St. Lawrence or into the Ottawa, and 13 into smaller rivers.

Ontario reports 20 discharging into the St. Lawrence, or into the Ottawa River, or into the Great Lakes, and 30 into smaller rivers and lakes.

Manitoba reports 5 discharging into the Red and Assiniboine Rivers.

In Saskatchewan, 2 discharge into the Saskatchewan River and 2 into small creeks.

In Alberta, 3 discharge into the Saskatchewan, 5 into smaller rivers.

Question 3. The Maritime Provinces, Quebec, and Manitoba, report no sewage disposal plants.

British Columbia reports 1 place with tank treatment.

In Ontario there are 15 reported, 9 with tank treatment only, 4 with tanks and bacteria beds, 1 intermittent sand filter, and 1 with treatment on land.

Saskatchewan and Alberta each report 1 place with septic tanks and a few others in which the newer processes are contemplated at an early date or are actually under construction.

That is, only 18 places report any kind of purification, and in 12 of these it is limited to treatment in tanks.

Questions 5, 6 *and* 7. Of the 166 places reporting, 145 have waterworks. Of these, 36 have supplies from underground sources, 44 obtain their supplies from small lakes and streams in practically uninhabited watersheds, 25 from the Great Lakes and the St. Lawrence and Ottawa Rivers, and 40 from lakes and streams liable to some contamination by sewage.

14 places report mechanical filters for the water supply, 1 place a slow sand filter, and 9 natural filtration through river beds. In Toronto and Montreal the water is treated with hypochlorite.

The information furnished by these replies shows that not much has yet been done in Canada, in the way of the purification of either water or sewage. At the same time, it indicates that favourable local circumstances in many cases have so far prevented any serious consequences. Nowhere in Canada do such adverse conditions exist

as are frequently met with in other countries, as for example, on the Hudson, Merrimac, Passaic, Susquehanna, and other rivers in the United States. These facts do not detract from the importance of the subject of this report, but rather serve to emphasize the necessity of taking prompt and effective measures to put an end where possible to any present pollution of the lakes and streams and to prevent it in the future.

In the Maritime Provinces the sewage is in most cases discharged into sea water unfit for domestic supplies, and where the dilution is sufficient to prevent nuisances. In such cases there is no immediate need of sewage purification.

In Quebec and Ontario, many of the towns discharge their sewage into, and obtain their water supplies from, the Ottawa and St. Lawrence Rivers or the Great Lakes. While the dilution is great, the water is, in important cases, unsafe for drinking without previous purification, and sometimes the effect of eddies results in the contamination of the water supply by the sewage of the same place. In such places, at least, thorough purification of the sewage as well as filtration of the water may be necessary.

The need of both water filtration and sewage purification will obviously be greater in the interior sections of these provinces, where the only available source of water supply may be from the smaller lakes and rivers tributary to the St. Lawrence and Ottawa Rivers and the Great Lakes.

In the Northwest Provinces the water supply problem is an unusually difficult one, as it must in many cases be obtained from the rivers which receive more or less directly the discharge from all sewerage systems.

In British Columbia the conditions on the coast are similar to those in the Maritime Provinces. Up to the present time the water supplies have been obtained from mountain streams or lakes whose water sheds can be protected. The necessity for sewage purification is therefore far less urgent than in the interior provinces.

Legal.

Before submitting our conclusions and recommendations with respect to the subject of this report, it is desirable that some idea should be given of the legislation dealing with this question of sewage disposal, which, after considerable experience, it has been found expedient to adopt in older countries.

In England, the Public Health Act of 1875, and the Rivers Pollution Act of 1876, and subsequent amendments depute to the Local Government Board the supervision of sewage disposal. The 1875 Act requires the sanction of the Board for the raising of loans for the purpose, and gives the Board power to require land treatment

in all cases. The 1876 Act prohibits the throwing of any solid or liquid sewage into the streams and the pollution of the streams by sewage and manufacturing refuse, but certain qualifications have rendered these laws more or less ineffective. Such Acts as the Mersey and Irwell Act, and the West Riding of Yorkshire Act, have since been passed, which provide for the formation of joint Committees for the purpose of administering the Rivers Pollution Prevention Act. These committees are given special powers against the pollution of streams by solid matter and domestic and manufacturing sewage, but in the latter case proceedings can only be taken with the sanction of the Local Government Board.

France.

In France, plans for sewage disposal after being submitted to the engineers in charge of the body of water into which the effluent is to be discharged (navigable rivers, non-navigable rivers, or the sea), must then be approved by the Departmental Board of Health if the population of the town is less than 5,000; or to the Conseil d'Hygiene Superieur. if it is 5,000 or more.

Germany.

In Germany the various Federal States each have their own laws relating to river pollution. As most of the German rivers flow through several states, attempts have frequently been made to obtain Imperial legislation, but the constitution renders this impossible. It, however, places the supervision and legislation concerning measures to be adopted by the Medical and Veterinary Police authorities in the hands of the Imperial Government and hence the Epidemic Diseases Act of June 30th, 1910, stipulates that methods for the disposal of waste shall be supervised by the State. Provision is also made for the formation of an Imperial Council of Health, the work of which, so far as river pollution is concerned, is restricted to those waters which flow by several of the Federal States.

United States.

The main features of the laws governing the disposal of sewage in the United States may be gathered from the data presented in Appendix II. which includes a list of questions sent to several of the States of the Union by the Board of Health of the Province of Quebec, together with the replies received.

Summary of Conclusions.

After a consideration of the various phases of the subject of this report our conclusions may be summarized as follows:

1. None of the methods of sewage disposal, which are feasible and economically applicable on a large scale, can be relied upon to effect complete purification. Effluents can, however, easily be produced which may be discharged into bodies of water without any danger of impairing the quality of the water as determined by chemical analysis. It has been demonstrated by experiment that treatment of these effluents by chloride of lime and other chemicals will greatly diminish the number of bacteria; but they may still persist in considerable and possibly dangerous numbers.

It may be added that chloride of lime is being successfully used for the disinfection of filtered and unfiltered water, and at a mere fraction of the cost of similarly treating sewage.

2. The distinction between the general surface drainage of a populated district and its urban sewage is one of degree only, and each in itself may render the water into which it discharges, unwholesome, and dangerous for drinking purposes.

3. Since much of the surface drainage cannot be even collected for treatment, and since sewage disposal processes in the present state of the art cannot be depended upon to effect complete bacterial purification, it follows that the raw water of rivers and lakes in populated districts can never be considered entirely safe, and fit for domestic supplies.

4. Experience has shown that water of even a considerable degree of pollution can be rendered pure and wholesome by filtration, and, for practical purposes this is the only reliable means of ensuring the safety of surface supplies from unprotected watersheds.

Towns and cities which take their supplies from suspicious sources should not depend for their safety upon the efforts of others, but should themselves adopt such precautions as are available. To require the purification of the sewage of a large city, in order to afford protection to the water supplies of one or two small places down stream, which could be more effectively accomplished at a much lower cost by filtration, would be at least an unbusinesslike procedure. As a matter of fact each case constitutes a separate problem in itself, and whether sewage purification or water filtration is demanded, or whether both are necessary, are questions which should be dealt with by properly qualified experts.

5. In Canada up to the present time practically nothing has been done in the way of purifying the sewage of municipalities, except in the case of less than half a dozen places in the Province

of Ontario. During the last two of three years, however, the importance of the subject has been gaining general recognition. While the climatic conditions are in some parts of the country unusually severe, there is little doubt that the methods which have proved effective in other countries can be employed successfully here, though special provision will be necessary to ensure efficient operation during cold weather.

6. The Public Health Acts of the different Provinces provide in a general way against the discharge into bodies of water of matter which would cause nuisances, or which would endanger the public health. Such laws lack definiteness, and are therefore generally ineffective. A consideration of the legislation on the subject of sewage disposal and stream pollution, indicates that the best laws are those which, instead of attempting to formulate specific rules or regulations which can never have more than local application, require all plans for proposed works to be submitted for approval to the Provincial Boards of Health, or other properly constituted bodies. These should have the power to enforce their recommendations with regard to both sewage disposal and the filtration of water supplies. Such power is very effectively secured by Section 23 of the Saskatchewan Act. (See Appendix III.)

Interprovincial and International rivers should be subject to joint Federal and Provincial control, and it is desirable that all legislation on the subject should be as nearly uniform as possible.

Finally, the existing legislation on the subject in Canada is outlined in Appendix III., which contains extracts from the Public Health Acts of the different provinces relating to stream pollution and sewage disposal.

R. S. LEA,
Chairman.

COMMITTEE.

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APPENDIX I.

(Report of Committee on Sewage Disposal.)

REPLIES TO QUESTIONS FROM CITIES AND TOWNS IN CANADA.

QUESTIONS ASKED:

1. *Is the sewerage system of your city separate or combined (i.e., do the sewers carry domestic sewage only, or do they also provide for street drainage and storm water in the same pipe)?*

2. *Do your sewers discharge directly into a lake or stream? If so, please give the names.*

3. *Is the sewage treated or purified in any way? If so, please describe method, giving information as to whether it has been successful and whether any difficulties have been met with in operating it, especially referring to winter troubles.*

4. *What tests have been made to determine the character of the treated sewage? Please give the results of any such tests.*

5. *Where is the water supply obtained from? If from a river or lake, please give the name.*

6. *If water supply is obtained from a stream, is there any considerable discharge of sewage or factory refuse above, or if obtained from a lake, is there any considerable discharge near the point where the supply is obtained?*

7. *Is the water supply filtered or otherwise purified, and if so, by what means, and are the results satisfactory? Has any analysis of the water been made? If so, give results.*

AMHERST, Nova Scotia. Population, 6,050.

1. Combined.
2. La Planche River to Bay of Fundy.
3. Sewage not treated.
4. None.
5. From Nappan River.
6. No sewage or factory refuse in vicinity. River runs through farming country.
7. No late analysis. Water very satisfactory.

ANNAPOLIS ROYAL, Nova Scotia. Population, 1,010.

1. No sewerage system.
5. From a small lake called First Pond.
6. No discharge near water supply.
7. Water taken direct from lake without filtering.

DARTMOUTH, Nova Scotia. Population, 5,000.

1. Combined.
2. Discharge into the harbour of Halifax.
3. None of it treated.
5. From Lamont and Topsail Lakes, situate about two miles east of town.
6. None.
7. Not filtered or purified. No analysis since system installed. Analysis made before installation very satisfactory.

DIGBY, Nova Scotia. Population, 1,150.

1. Separate.
2. Annapolis Basin.
3. No.
4. None.
5. Broad Cove Brook and Lily Lake.
6. None.
7. Water not filtered. Results satisfactory. No analysis has ever been made of water.

HALIFAX, Nova Scotia. Population, 50,000.

1. Combined.
2. Into Halifax Harbour.
3. Not treated.
4. None.
5. Spruce Hill Lakes and Long Lake.
6. No.
7. Unfiltered. Analysis satisfactory.

KENTVILLE, Nova Scotia. Population, 2,500.

1. Combined.
2. Cornwallis River, tidal.
3. No. No trouble experienced.
4. No tests.
5. Magee Lake, on South Mountain, 5 or 6 miles south of town.
6. Nothing.
7. No. Water has been tested and found all right. Cannot give details.

MIDDLETON, Nova Scotia. Population, 1,000.

1. Combined. Only street drainage and storm water.
2. Discharges into Annapolis River direct.
3. No provision made for purification, only by cesspits, which are built of brick and cement, and cleaned every spring.

4. No tests.
5. From lake on top of North Mountain. Lake fed by spring water, which is very pure.
6. No.
7. Not filtered. Water runs from lake to reservoir over rocky ground, thence to town through two miles of covered pipes.

NEW GLASGOW, Nova Scotia. Population, 6,500.

1. No regular sewerage system.
5. From the Middle River of Pictou.
6. None.
7. Filtered at the pumping station. No analysis has been taken; gravel, and charcoal filter bed. Satisfactory.

PARRSBORO, Nova Scotia. Population, 2,705.

1. None.
5. From Lake.
6. None.
7. First-class lime and gravel.

PORT HAWKESBURY, Nova Scotia. Population, 1,000.

1. No town sewerage. A few private sewers.
2. Into Strait of Canso.
3. No.
4. None.
5. No town system. A few artesian wells for private use.

LIVERPOOL, Nova Scotia. Population, 2,000.

1. Sewerage separate; stone drains carry the water.
2. Discharge in Main River.
3. Not treated in any way.
5. Lake Town.
6. None.
7. Not filtered or purified. Analysis report it very pure.

ARICHAT, Nova Scotia. Population, 1,000.

1. No sewerage system.

GLACE BAY, Nova Scotia. Population, 7,000.

1. Combined.
2. Discharge into the sea.
3. No.

4. None.
5. From a lake known as Sand Lake.
6. The lake is situated miles away from any town. Its drainage area is free from sewage drainage. The drainage surface covers an area of about 3,000 acres, with four families on that whole area. The area of the lake is about 400 acres.
7. The water supply is not filtered or otherwise treated. An analysis was made some years ago. Results highly satisfactory.

LUNENBURG, Nova Scotia. Population, 3,000.

1. No sewerage system.
5. Lake (called Cantilopes Lake).
6. Yes. Our pump is supplied from lake by water power.
7. Not filtered. Tested and practically pure.

SHELBURNE, Nova Scotia. Population, 1,500.

1. No sewerage system.

TRURO, Nova Scotia. Population, 6,000.

1. Separate. Both satisfactory.
2. Salmon River at Tide Water.
3. No.
4. None.
5. Leper Brook. Protected watershed.
6. No.
7. No filters. Frequent analysis, always satisfactory.

STELLARTON, Nova Scotia. Population, 3,000.

1. Separate.
2. Into East River.
3. No.
4. No tests.
5. From East River.
6. Very little discharge.
7. Yes, by gravel filtration. No analysis for some years.

SYDNEY, Nova Scotia. Population, 15,000.

1. Both systems. In certain districts brooks take care of surface water. Most sewers on combined plan.
2. Sydney Harbour.
3. No.
4. None.

5. Sullivan's Brook.
6. No. Watershed sparsely populated. Some swampy districts give water high colour certain seasons.
7. No. Water highly coloured. High in organic matter.

WINDSOR, Nova Scotia. Population, 3,750.

1. Combined.
2. Directly into Avon River which fills and empties twice in 24 hours.
3. No.
4. No tests made.
5. Mill Lakes, so called.
6. Water supplied from lakes about 8 miles from town.
7. Water passes through screens into main. Analysis made and result satisfactory.

WOLFVILLE, Nova Scotia. Population, 2,000.

1. Combined.
2. Into a creek where tide ebbs and flows twice every 24 hours.
3. Flush sewers twice a year.
4. None.
5. From brooks and springs on South Mountain, five miles from town. Town owns 600 acres around source.
6. None.
7. Water is brought from mountain to large reservoir, from which town receives supply. No filters.

CAMPBELLTON, New Brunswick. Population, 3,500.

1. Separate.
2. Directly into Restigouche River, or rather its estuary, the Bay of Chaleur. Tidal water.
3. No.
4. None.
5. Parker Lake brooks. Unpolluted watershed.
6. No.
7. No. Analysis made once proved the water to be absolutely free from impurities.

ST. JOHN, New Brunswick. Population, 41,000.

1. Combined.
2. The ocean.
3. No.
4. None.

5. Lake Lomond.
6. None. The city controls the watershed.
7. No.

ST. ANDREWS, New Brunswick. Population, 1,100.

1. Combined.
2. Discharge into harbour (salt water).
3. No occasion for purification.
4. None.
5. At present from artesian and surface wells. Water connection with lake now being established.
6. No discharge whatever in lake.
7. Analysis of lake water shows it to be "clear, colourless, odorless, free from bacteria."

EDMUNDSTON, New Brunswick. Population, 500.

1. No sewerage system.
5. Water system in construction. Water taken from wells.

NEWCASTLE, New Brunswick. Population, 2,600.

1. Combined.
2. Yes. Miramichi River.
3. No.
4. None.
5. Artesian wells.
7. No.

CHATHAM, New Brunswick. Population, 6,000.

1. Separate.
2. Directly into Miramichi River in tidal waters.
3. No.
4. None.
5. Morrison Brook, 2 miles from town.
6. None.
7. No.

FREDERICTON, New Brunswick. Population, 7,117.

1. Separate.
2. Into St. John River.
3. No.
5. From St. John River, 2 miles above sewer outlet.

6. Woodstock, Grand Falls, and several up-river towns empty sewage into river.
7. Water is filtered (mechanical filtration), results are satisfactory. No analysis made of late.

MONCTON, New Brunswick. Population, 9,026.

1. Combined.
2. Into the Petitcodiac River.
3. No.
4. None.
5. From reservoirs from brooks supplied by springs.
6. None.
7. Not filtered.

RICHIBUCTO, New Brunswick. Population, 1,900.

1. No sewerage system.
2. Private Sewers, discharge into Richibucto River.
3. No.
5. No public water supply. Bored wells.

BEDFORD, Quebec. Population, 1,400.

1. No system.
2. Surplus water from streets carried to Pike River by means of gutters or ditches.

CHICOUTIMI, Quebec. Population, 4,000.

1. Combined.
2. In the Saguenay River.
3. No.
4. No test.
5. From Chicoutimi River.
6. No discharge of sewage or factory.
7. No.

COOKSHIRE, Quebec. Population, 1,150.

1. Combined.
2. Stream, Eaton River.
3. No.
4. None.
5. None; springs.
6. None. Springs 1½ to 3¾ miles from main reservoir and town.
7. No.

DANVILLE, Quebec. Population, 1,300.

1. No regular system. Two lines of tile pipe on two main streets. Few private drains.
2. No.
3. No.
4. None.
5. Small brook known as Beaver Creek.
6. None.
7. Charcoal filter. Analysis made year ago, good.

FRASERVILLE, Quebec. Population, 5,000.

1. Combined on main street, separate on other streets.
2. Part into St. Lawrence River, other part into River du Loup.
3. No. Quantity of water in the rivers where the sewage is discharged is sufficient to prevent trouble.
5. From a lake fed with springs.
6. None.
7. No filtration is necessary. Analysis of the water found perfectly good.

HUNTINGDON, Quebec. Population, 1,200.

1. Domestic only.
2. Into River Chateauguay below village.
3. No.
4. None.
5. From River Chateauguay above village.
6. None.
7. Filtered through charcoal. Results satisfactory. Analysis good.

JOLIETTE, Quebec. 5,200.

1. Combined.
2. Into River L'Assomption.
3. No.
5. From the River L'Assomption.
6. None.
7. Analysis satisfactory.

LACHUTE, Quebec. Population, 2,500.

1. No sewerage.
5. Lake St. John.
6. No refuse.
7. Not filtered.

MAGOG, Quebec. Population, 3,576.

1. Main sewers combined.
2. Into Magog River.
3. No.
5. Lake Memphramagog.
6. None. Typhoid practically unknown.
7. Not filtered, pumped to reservoir. Analysis made—very free from organic and inorganic matter.

MONTREAL, Quebec. Population, 500,000.

1. Combined.
2. Nearly all into St. Lawrence River. One sewer connects with Back River, the sewage passing through a sewage farm.
3. One sewage farm for St. Denis Ward. Sewerage effluent passing to the Back River in Ahuntsic.
4. None, but effluent from St. Denis sewage farm has been analysed.
5. St. Lawrence River.
6. No.
7. Water sterilized by hypochlorite of lime process. Bacteria in raw water from 400 to 2,000 per c.c. Reduced by treatment to 5 to 50 bacteria per c.c. Analysis made daily.

QUEBEC, Que. Population, 70,000.

1. Combined.
2. Discharge into St. Charles and St. Lawrence Rivers.
3. No.
4. None.
5. River St. Charles, discharge of Lake St. Charles.
6. No pollution of the river above the dam.
7. Not filtered. Analysed weekly. Copy of one analysis sent indicates very good water.

RIMOUSKI, Quebec. Population, 3,500.

1. Combined.
2. Into St. Lawrence River.
3. No.
4. None.
5. Lake, called Lac St. Anaclet. Situated 6 miles from town in the mountains.
6. None.

ST. HYACINTHE, Quebec. Population, 12,000.

1. Combined.
2. Into Yamaska River.
3. No.
5. Yamaska River.
6. An inconsiderable discharge of sewage many miles above suction line.
7. Filtered, but filtering capacity not sufficient to make a good report.

ST. JEROME, Quebec. Population, 4,500.

1. Separate.
2. North River.
3. No.
4. None.
5. From a spring for drinking purposes, and North River for fire.
6. None.
7. Not filtered.

MONTMAGNY, Quebec. Population, 2,000.

1. No sewerage system.
2. In streams.
3. No.
5. From springs.
6. No.
7. Good clear water.

ROBERVAL, Quebec. Population, 1,500.

1. No sewerage system.
2. In Lake St. John.
3. No.
4. None.
5. Water supply is by springs and streams.
6. No.
7. Water filtered and results satisfactory.

LACHINE, Quebec. Population, 5,700.

1. Combined.
2. Into the stream called "The Little River St. Pierre."
3. No.
4. None.
5. From the St. Lawrence River.
7. No.

FARNHAM, Quebec. Population, 3,200.

1. Combined.
2. Yamaska River.
3. No.
4. None.
5. From the River Yamaska, 2 miles above.
6. No.
7. Analyses prove good.

THREE RIVERS, Quebec. Population, 10,000.

1. Combined.
2. In St. Lawrence River.
3. No.
4. None.
5. From St. Maurice River.
6. Pulp and paper factory at about 21 miles up.
7. Filtered. Pressure filters.

SOREL, Quebec. Population, 7,000.

1. Combined.
2. The sewers discharge in the Richelieu River and in the St. Lawrence.
3. No.
4. No.
5. From the Richelieu River.
6. There is some discharge of sewage not very far from the point of supply.
7. No.

WATERLOO, Quebec. Population, 2,000.

1. No sewerage system.
2. No.
3. No.
4. No.
5. From spring.
6. No.
7. Analyses have been made. Water first class.

SHAWINIGAN FALLS, Quebec. Population 3,413.

1. Combined.
2. Into St. Maurice River.
3. No.
5. St. Maurice River.

SHERBROOKE, Quebec. Population, 15,000.

1. Combined.
2. Into St. Francis and Magog Rivers.
3. No.
4. None.
5. From Magog River.
6. About 15 miles from point of intake, some sewage discharge, but in that space a lake 7 miles long by 1 mile wide, which acts as settling basin.
7. No. Analysis defined the supply as a good potable water for domestic purposes.

WESTMOUNT, Quebec. Population, 12,000.

1. Combined.
2. Discharge into Montreal sewers.
3. No.
5. St. Lawrence, near head of Nuns' Island.
6. Yes. 1 mile below and 7 miles above.
7. No filtration at present. Contract calls for filtered water in eighteen months.

WINDSOR MILLS, Quebec. Population, 2,700.

1. Domestic sewage only.
2. Discharge directly at one place into the St. Francis River.
3. No.
4. None.
5. One-third obtained from springs and two-thirds from Windsor River, which empties into the St. Francis.
7. Windsor River water filtered through gravel or sand.

AMHERSTBURG, Ontario. Population, 2,500.

1. Combined.
2. Into Detroit River.
3. No.
4. None.
5. Detroit River, above all sewer outlets.
6. By-law prohibits anyone from draining into river within 2 miles of intake pipe.
7. No filter.

BARRIE, Ontario. Population, 5,000.

1. Separate.
2. Part of it enters direct into Lake Simcoe.

3. Most of it treated through septic tank. No winter experience yet.
4. None.
5. Artesian wells.
7. No.

BERLIN, Ontario. Population, 10,000.

1. Separate.
2. No.
3. Purified by septic tanks and sand filtration. Very successful in operation.
4. Sewage treated is domestic and factory. Effluent analyzed, the treatment running about 97% purification.
5. Artesian wells.
7. Water is not purified. Analyses show it to be good.
6. Sewage from town of Grand'Mere about 7 miles above town.
7. No. Analysis very fair.

BRAMPTON, Ontario. Population, 3,000.

1. Domestic sewage only, with exception of small portion of street, which carries street drainage.
2. Septic tanks, outflow from which discharges into a stream called Etobica River.
3. In septic tanks, outflow passing into the river which purifies itself.
4. None. But complaints of river below septic tank being contaminated especially during low water.
6. From a small lake, covering about 40 acres and supplied by springs.
6. None.
7. No filtration. Analysed periodically and stands high test of purification.

BRANTFORD, Ontario. Population, 17,000.

1. Separate.
2. Into Grand River, 5 miles below city.
3. None. Septic tanks and bacteria beds proposed.
5. From a series of collecting pipes distant ½ mile from Grand River and below level of stream.
6. Town of Paris, 9 miles above Brantford. Has no sewerage system, Grand River its only outlet.
7. Natural filtration through bed of river. Last analysis shows freedom from infection with harmful bacteria.

BRUCE MINES, Ontario. Population, 900.

1. No sewerage system.

BRUSSELS, Ontario. Population, 1,300.

1. Street only.
2. Into Maitland River.
3. Some private septic tanks.
4. None.
5. All water for domestic purposes from drilled wells. No water system.
6. No.
7. No filtration.

CHATHAM, Ontario. Population, 10,000.

1. Combined.
2. Into River Thames.
3. No.
5. River Thames, above city.
6. None.
7. Put into sedimentation tanks and then filtered. First class results. Government analysis regularly shows hard, first class water.

PORT HOPE, Ontario. Population, 5,000.

1. Separate. Domestic sewage only.
2. Into Lake.
3. No.
5. From Lake Ontario.
6. No.
7. Filters. Natural filtration. Water good.

COLBORNE, Ontario. Population, 1,100.

1. No sewerage system.
5. From wells.

DRESDEN, Ontario. Population, 1,700.

1. No sewerage except for street.
2. Into Sydenham River.
5. From private wells.

EXETER, Ontario. Population, 1,800.

1. No sewerage system.
5. From river, for fire protection only. System under construction.

FORT FRANCIS, Ontario. Population, 500.

1. Combined.
2. Into Rainy River.
3. No.
5. Rainy Lake.
6. Source of supply uncontaminated.
7. About a dozen analyses show good results.

FORT WILLIAM, Ontario. Population 20,000.

1. Combined.
2. Into Kaministiquia and Neebing Rivers.
3. Not treated.
4. None.
5. From Loch Lomond, 8 miles from city.
6. None. Watershed uninhabited and nearly all owned by city or Government.
7. Not filtered. No chemical pollution or harmful bacteria present. One part of chlorine per million.

GLENCOE, Ontario. Population, 1,100.

1. No sewerage system, merely a drainage system.
5. Artesian Wells.

GUELPH, Ontario. Population, 12,000.

1. Separate.
2. Not directly. Sewers discharge in two pairs of settling tanks, each 16′ x 100′ x 6′ deep.
3. After passing through tanks, sewage is filtered through artificial filters of broken stone and sand. Operation satisfactory. Six filters in use, each 40′ x 210′. In winter, effluent is discharged into River Speed.
4. None. Filter effluent quite clear.
5. From springs about 4 miles east of city.
7. The water is not filtered. No recent analysis.

HAILEYBURY, Ontario.

1. Separate system. Storm water empties into lake.
2. Lake Temiskaming
3. Domestic sewage discharges into septic tanks. No chemicals used for purification. Tanks only been in use six months. Effluent discharged 800′ from shore.
4. None.
5. From Lake Temiskaming 1,200′ from shore.

6. Discharge ½ mile below water intake.
7. Water is not filtered. Government analysis satisfactory.

KENORA, Ontario. Population, 6,000.

1. Combined.
2. Into Lake of the Woods.
3. Not treated in any way.
4. None.
5. From Lake of the Woods.
6. None within 90 miles.
7. Water not filtered but analysis shows water to be pure.

KINGSTON, Ontario. Population, 18,000.

1. Combined.
2. Head of St. Lawrence River.
3. No.
4. None.
5. Head of St. Lawrence River. Intake pipe extends ½ mile into river.
7. Always pure.

LONDON, Ontario. Population, 40,000.

1. Separate, but down town section, combined.
2. No.
3. Sewage treated by draining through bacteria beds composed of coke, thence to river. No serious difficulty in winter.
4. None.
5. Springs and wells.
6. None.
7. "Pure spring water." Analysis December 4, 1909.

MAXVILLE, Ontario Population, 800.

1. Drain for carrying off street water.
2. Into a small creek.
5. From Wells.

ELMIRA, Ontario. Population, 1,100.

1. No sewerage system.

HESPELER, Ontario. Population, 2,500.

1. None.
2. None.
3. None.
5. Wells owned privately.

GEORGETOWN, Ontario. Population, 1,400.

1. Only street and storm drainage.
2. Into flowing stream.
3. None.
4. None.
5. From reservoir 3 miles from town. Pure spring water.
7. Not filtered, water pure. Gravitation system 3 miles through pipes.

MARMORA VILLAGE, Ontario. Population, 1,000.

1. No sewerage system.
5. Water obtained from wells.

MIDLAND, Ontario. Population, 4,000.

1. Separate.
2. Georgian Bay.
3. No.
5. Springs.
6. Absolutely pure spring water.
7. No.

MITCHELL, Ontario. Population, 2,000.

1. No sewerage system. Each has separate drains to river.
5. Water from wells.

MORRISBURG, Ontario. Population, 1,700.

1. Sewers for surface water.
2. St Lawrence River and canal.
5. St. Lawrence River.
6. Protected for 3 miles on North by canal, and on South by Ogden's Island.

MOUNT FOREST, Ontario. Population, 2,100.

1. No sewerage system.
3. Artesian wells.
6. Water considered first class.
7. Analysis made yearly, always good.

NIAGARA FALLS, Ontario. Population, 4,400.

1. Combined.
2. Niagara River.
3. No.

5. Niagara River. Intake above Falls.
6. Not directly on Canadian side, though cities on American side complain of Buffalo sewage.

NORTH BAY, Ontario. Population, 2,700.

1. Separate.
2. No. Sewerage passes through septic tanks into Lake Nipissing.
3. Not more than by passing through septic tanks.
4. None.
5. From Trout Lake, about 3 miles from the town.
6. No.
7. Not filtered. Analysis of water shows it to be very good.

OAKVILLE, Ontario. Population, 1,800.

1. No sewerage system.
5. 1,600' out in Lake Ontario,
6. Creek empties about 1 mile from mouth of intake.
7. Not filtered. Analysis has been made from lake at mouth of intake which has shown good results.

ORILLIA, Ontario. Population, 5,000.

1. Separate.
3. Sewerage treated in liquefying tanks and distributed on farm owned by Corporation on shore of Lake Simcoe. Only seepage goes to lake.
4. None.
5. Springs about a mile from town and at higher elevation.
6. None.
7. No filtration. Analysis satisfactory.

OSHAWA, Ontario. Population, 4,500.

1. Separate.
2. Into a small stream.
3. Tanks for treatment proposed.
5. From Lake Ontario.
6. Sewage outlet 1½ miles east of intake. Toronto 30 miles west.
7. Not filtered. Any analysis has been satisfactory.

NEWMARKET, Ontario. Population, 2,300.

1. No sewerage system.
5. Artesian wells.
7. Water from wells 300' deep. Water pure.

PALMERSTON, Ontario. Population, 2,000.

1. Combined.
2. Into a creek.
3. Plans prepared for septic tanks, not yet constructed.
4. None.
5. From artesian wells 360' deep.
7. No filtration. Analysis shows no trace of chlorine or harmful bacteria.

PORT ARTHUR, Ontario. Population, 3,500.

1. One part separate, and one part combined.
2. Into Lake Superior.
3. No.
5. From Lake Superior.
6. Nearest sewer outlet is about 2 miles from the intake pipe for the water supply.
7. Not filtered. Tests made show water absolutely free from contamination and very pure.

PORT COLBORNE, Ontario. Population, 1,400.

1. No system, only cesspools in back yards. Street and storm water goes off in covered drains.
5. From the harbour entrance on the canal side, just where it flows in from Lake Erie.
6. No discharge or refuse of any kind within a mile of intake.
7. No filtration. Analysis shows water to be absolutely pure.

PRESCOTT, Ontario. Population, 3,200.

1. Sewerage only.
2. St. Lawrence.
3. No.
4. None.
5. St. Lawrence River.
6. No.
7. No filtration. Several analyses every year. Always almost reported pure.

RAINY RIVER, Ontario.

1. Separate. Domestic sewerage only.
2. Rainy River.
3. Sedimentation tanks at present being installed.
5. Rainy River.
6. Discharge of sewage about 1 mile lower down stream.
7. Not filtered or purified.

RENFREW, Ontario. Population, 3,300.

1 Separate.
2. Bonnechere River.
3. No.
4. None.
5. Bonnechere River above the sewer.
6. Not aware of any.
7. Yes, sand filtered. Tests show good pure water.

SHELBURNE, Ontario. Population, 1,200.

1. No sewerage system.
5. Water obtained from three wells.

SIMCOE, Ontario. Population, 2,800.

1. Street sewers only for storm drainage.
2. Discharges into Lynn Creek below dam on Eastern part of town.
3. No.
4. From springs located ½ mile west of town.
6. No discharge.
7. Filtered through basin. Last analysis—2¾ parts chlorine per million.

STRATFORD, Ontario. Population, 10,000.

1. Combined, but changing to separate.
2. It is treated.
3. Treated for last six years by septic tanks and coke filters. Unsatisfactory now. Changing system to sprinkling filter of crushed limestone.
4. Septic tanks have given 40 to 60% purification. Test with sprinkling filter, 98%.
5. From six artesian wells.
7. Pressure filters.

SUDBURY, Ontario. Population, 2,200.

1. Domestic sewage.
2. Junction Creek and Nolin Creek.
3. No.
5. Ramsay Lake.
6. None.
7. Water pumped from lake into 75,000 gallon tank.

TORONTO, Ontario. Population, 350,000.

1. Combined.
2. Into Toronto Bay and Lake Ontario.
3. Sewage in small district of city (population 4,000) treated in septic tanks and contact beds. Results very satisfactory. Sedimentation tanks for disposal of all sewage at one central point now under construction.
5. Lake Ontario, 2,500′ from shore, in a depth of 116′.
6. Into Toronto Bay and Lake Ontario, intake pipe protected by sand bar.
7. Treating with hypochlorite of lime; constructing slow sand filters. Analysis shows from 80 to 900 bacteria per c.c., with occasional traces of coli.

GODERICH, Ontario. Population, 4,500.

1. Combined.
2. Into Lake Huron, some distance to the south of the town.
3. Not treated.
4. None.
5. From Lake Huron.
6. A considerable distance from sewer outlet, and to the north of it.
7. Sedimentation basin used. Water analysed quite often, and always found to be first-class.

NORWOOD, Ontario. Population, 1,000.

1. No sewerage system.

ARTHUR, Ontario. Population, 1,400.

1. No sewerage system.

ELORA, Ontario. Population, 1,300.

1. No sewerage system.
5. Wells and springs.

NEW LISKEARD, Ontario.

1. Separate.
2. No. Sedimentation tanks.
3. No. System not in full operation. Only recently installed.
4. None.
5. Springs from a limestone formation.
6. Amply protected from pollution. Water very good.
7. No.

PICTON, Ontario. Population, 4,000.

1. No sewerage system. Open drains in streets.
2. Into Bay of Quinte.
3. No.
5. Water supply not used for domestic purposes, but for fire protection, pumped from Bay. Wells used for domestic purposes.
7. No.

PENETANGUISHENE, Ontario. Population, 2,500.

1. Combined.
2. Yes. Georgian Bay.
3. No.
4. None.
5. Springs.
7. Not treated in any way.

DESERONTO, Ontario. Population, 3,700.

1. Two or three sewers carry domestic sewage with street drainage and storm water. The other sewers only provide for street drainage and storm water.
2. Bay of Quinte.
3. No.
5. Bay of Quinte for town purposes, such as fires, etc. Wells for drinking water.
6. No.
7. No. Supply obtained from wells.

BOBCAYGEON, Ontario. Population, 1,000.

1. No sewerage system.
2. None.
5. From wells and a spring.
7. Not filtered. An analysis of some wells has been made.

ST. CATHARINES, Ontario. Population, 10,000.

1. Combined.
2. Into a stream discharging into the lake.
3. No treatment of any kind.
4. No tests.
5. Supply of water comes from Lake Erie.
6. Tests have frequently been made. Very satisfactory.
7. No filtration found necessary as yet.

RAYMOND, Ontario.

1. No sewerage system.
5. From spring 1½ miles from town.
6. No sewage discharged therein.
7. No.

LAKEFIELD, Ontario. Population, 1,300.

1. Storm water and street drainage sewer.
2. Yes. Otonobee River.
5. Wells.

PORT DOVER, Ontario. Population, 8,000.

1. No sewerage system.

FORT ERIE, Ontario.

1. No sewerage system.
5. From Lake Erie.
6. No.
7. The water used has been analysed and pronounced strictly pure.

TAVISTOCK, Ontario. Population, 500.

1. No sewerage system.
5. From well with small pumps.
6. No.

INNISFAIL, Ontario.

1. No sewerage system.
5. Wells, property of owners.
7. No.

ARNPRIOR, Ontario. Population, 4,300.

1. Combined.
2. Into the Madawaska River. One main sewer.
3. No.
4. None.
5. Madawaska River. Supply taken above the town and sewer discharge at foot of 20' fall.
6. No.
7. Filtered by pressure sand filters, using alum scum on sand. Water first-class.

KINGSVILLE, Ontario. Population, 1,600.

1. Combined.
2. Lake Erie.
3. No.
4. None.
5. Lake Erie.
6. No.
7. No.

ST. THOMAS, Ontario. Population, 12,000.

1. Combined.
2. Discharge into Kettle Creek.
3. Septic tanks installed. Have been in use about a year, and up to the present time the only deficiency has been the deposit of grit. Chamber has to be cleaned out frequently.
4. Test on sewage. In influent—Total organic nitrogen, 52.34 parts per million. In effluent—Total organic nitrogen, 9.67 parts per million.
5. Water supply obtained from Kettle Creek, and also from wells.
6. No discharge of sewage or refuse above.
7. Filters of New York Continental type, being 8' cylinders, 20' long, and 6 in number. Laboratory Analysis: Purification of 98—99% of total bacteria. Colon always present in creek water, none in filtered. Runs 5 to 20 bacteria per c.c.

COBOURG, Ontario. Population, 4,500.

1. Domestic and roof water.
2. Lake Ontario, through the harbour, which has an area of over 20 acres.
3. No.
5. Lake Ontario.
6. From a woollen factory, into a stream about a mile above the intake.
7. No.

THESSALON, Ontario. Population, 1,300.

1. Combined.
2. Thessalon River.
3. No.
4. No test.
5. Lake Huron.
6. None.
7. Medical Health Officer has sent samples of our water, taken from house taps, for analysis, and reports received were satisfactory.

HIGH RIVER, Ontario.

1. No sewerage system.

LEAMINGTON, Ontario. Population, 2,600.

1. No sewerage system.

PERTH, Ontario. Population, 3,700.

1. Carry both domestic and street drainage and storm water in same pipe.
2. Yes. River Tay, below the town.
3. No. No difficulties met with.
5. River Tay, above the town.
6. No.
7. Water supply filtered through bed of sand. Satisfactory. Analysis made every year. Results good.

IROQUOIS, Ontario. Population, 1,100.

1. Combined.
2. Into St. Lawrence River.
3. No. No winter troubles.
5. St. Lawrence River.
6. No.
7. No.

OTTAWA, Ontario. Population, 65,000.

1. Ottawa has combined sewerage system.
2. The older sewers discharge directly into the Ottawa River. The effluent coming from the more recently constructed system is treated. Septic tanks are used for treating the sewage, and have given satisfaction.
4. No bacteriological tests have been made of the treatment of sewage, but the effluent contains little or no solid matter.
5. The water supply is obtained from the Ottawa River, a mile up-stream from the city, and above any sewage outlet.
6. There is no considerable discharge of sewage above the intake pipe for many miles.
7. Purification plant has been estimated on, and the entire water supply recently reported upon. The matter is at present a subject for discussion in the City Council.

HAVELOCK, Ontario. Population, 1,000.

1. No sewerage system.

5. Up to the present our supply of water is taken from drilled wells.
6. No.

PETERBOROUGH, Ontario. Population, 12,000.

1. Principally separate. On a few streets combined.
2. Into Otonobee River.
3. Part of it treated. For the larger part of the city, not treated. The part treated is by sedimentation tank; it has given no trouble.
5. Otonobee River, above the city.
6. No.
7. Not filtered. Examined frequently, and satisfactory.

SMITH'S FALLS, Ontario. Population, 5,300.

1. Combined.
2. Rideau River.
3. Not treated in any way.
4. None.
5. Rideau River at Smith's Falls.
6. There is no discharge above in the immediate vicinity. Town of Perth discharges into a tributary of the stream about 12 miles away.
7. Not filtered. Water has been analysed at Toronto. Said to be without impurities.

BOWMANVILLE, Ontario. Population, 3,000.

1. No sewerage system.

TRENTON, Ontario. Population, 4,400.

1. No sewerage system.

NAPANEE, Ontario. Population, 3,800.

1. Combined.
2. Yes, into Napanee River.
3. No.
4. None.
5. Drinking water from wells in town. Waterworks system from Napanee River above town.
6. Only small amount of sewage, etc., from villages 5 or 6 miles and further above town.
7. No.

SANDWICH and WALKERVILLE, Ontario. Population, 4,000.

1. Combined.
2. Main sewers discharge into Detroit River.
3. No.
4. No tests.
5. From Detroit River.
6. Sandwich receives water supply from intake pipe about ⅛ mile below Walkerville sewer outlet. Also receive water supply from river. No large sewage system above Walkerville.
7. Several analyses made, and water supply found of various degrees of purity; generally fairly pure water.

WATERFORD, Ontario. Population, 1,200.

1. No sewerage system.
2. Nanticook Creek.
5. From wells altogether.

WESTON, Ontario. Population, 1,100.

1. No sewerage system.
5. Installing water-works system. Water to be taken from River Humber.
6. Very little sewage.
7. To be filtered by mechanical filters.

WINDSOR, Ontario. Population, 13,000.

1. Combined.
2. Detroit River.
3. No.
5. Detroit River.
7. No.

WOODSTOCK, Ontario. Population, 9,000.

1. Part combined, part separate.
2. Into septic tanks and filter beds, through two main sewers, north trunk and south trunk.
3. Septic tanks and filter beds. Fairly successful.
4. None.
5. From natural springs 3 or 4 miles south of city, and properly protected from contamination.
6. No.
7. No filtration. Water analysed frequently, and always found to be pure.

BRANDON, Manitoba. Population, 13,000.

1. Combined.
2. Assiniboine River.
3. No.
5. Assiniboine River.
6. No.
7. Filtered mechanically, and coagulant used.

SOURIS, Manitoba. Population, 1,000.

1. Separate.
2. No.
3. We are investigating sewage purification methods. Probably will adopt chemical purification on account of climatic conditions.
5. Wells.
7. Pure, but rather hard.

NEEPAWA, Manitoba. Population, 1,500.

1. No sewerage system.
2. No.
3. No.

GLADSTONE, Manitoba. Population, 1,000.

1. No sewerage system.
5. Private wells.

CARMAN, Manitoba. Population, 1,500.

1. Combined.
2. Boyne River.
3. No.
4. None.
5. Boyne River.
6. No.
7. No. Water not used for drinking purposes.

PORTAGE LA PRAIRIE, Manitoba, Population, 5,106.

1. Domestic sewage only.
2. Assiniboine River.
3. No.
5. Assiniboine River and wells.
6. None.
7. River water is taken from galleries and comes through 7′ or 8′ of sand before it enters well, and is pure and clean.

ST. BONIFACE, Manitoba. Population, 5,120.

1. Combined.
2. Red River.
3. No.
5. Wells, 6′ 8″. Propose a new well 30′ in diameter.
7. Not filtered or purified. Water very hard but pure.

WINNIPEG, Manitoba. Population, 110,000.

1. Combined.
2. Into the Red and Assiniboine Rivers.
3. No.
5. Artesian Wells.
7. Water naturally pure.

ESTEVAN, Saskatchewan. Population, 1,300.

1. None.
2. None.
5. From wells, used for fire protection only.
6. No.
7. No.

MOOSE JAW, Saskatchewan. Population, 6,250.

1. Practically separate, but some of water is let into the sanitary sewers.
2. Sewage passes through a septic tank, then directly into Moose Jaw Creek.
3. Septic tank only means of purification, and is considered very efficient. Prov. Government requires further filtration. The only difficulty in winter is the discharge of the effluent.
4. Tests made about a year ago and generally very favourable.
5. From Snowdy Springs about 8½ miles from Moose Jaw.
6. None.
7. Water is not filtered or otherwise purified. Analysis made with negative results. Two samples showed surface contamination.

PRINCE ALBERT, Saskatchewan. Population, 3,000.

1. Separate.
2. Into Saskatchewan River.
3. Intercepting sewer and purification works in course of construction.
4. None.
5. Saskatchewan River.

6. None.
7. Filter plant in course of construction.

REGINA, Saskatchewan. Population, 10,000.

1. Combined, but steps are being taken to make it a modified separate system.
2. No.
3. Present method through septic tank. Sedimentation tanks, biological filters, and disinfection tanks under construction.
4. None recently.
5. From springs running out of sandhills.
6. None.
7. Analysis shows water free from organic impurities.

SASKATOON, Saskatchewan. Population, 6,000.

1. Separate. Construction of storm sewers will probably commence in 1911.
2. Into south branch of Saskatchewan River.
3. Crude sewage discharged into river. Construction of complete sewage disposal will commence in May, 1911.
5. From south branch of Saskatchewan River.
6. No.
7. No, but a filtration plant will be installed in 1911.

CALGARY, Alberta. Population, 22,500.

1. Combined.
2. Into Bow River.
3. No.
4. None.
5. From the Elbow River, 13 miles west of city.
6. None.
7. Filtered into basin through coke and gravel. Results satisfactory. Analysis shows water pure.

CARDSTON, Alberta. Population, 1,000.

1. No sewerage system.

MACLEOD, Alberta. Population, 1,200.

1. Combined.
2. Old Man River.
3. No.
5. Old Man River.
6. No.
7. No filters. Government analyses very satisfactory.

EDMONTON, Alberta. Population 25,000.

1. Combined.
2. Into Saskatchewan River through three outlets.
3. Septic tank at one outlet. Further treatment by bacteria beds proposed.
4. None.
5. Saskatchewan River.
6. None above intake.
7. Mechanical filter for purpose of clarifying water during turbid season. Water analysis varies, so that single analysis would be misleading.

LETHBRIDGE, Alberta. Population, 5,000.

1. Separate adopted. Sanitary sewers only at present constructed. Storm sewers to be constructed in near future.
2. Into Belly River.
3. No. Sewage purification plant to be installed at once. Plant to consist of: 1st, sedimentation tanks; 2nd, trickling filters, with revolving distributor arms; and 3rd, disinfection by hypochlorite. Two analyses indicate a comparatively strong sewage.
5. From Belly River.
6. No considerable discharge of sewage above point where supply is obtained.
7. Water filtered through 4' of natural gravel and sand bed of river into receiving crib. Result satisfactory.

MEDICINE HAT, Alberta. Population, 4,000.

1. Separate.
2. Into South Saskatchewan River.
3. None. Installation of system under consideration.
5. From South Saskatchewan River.
6. Considerable discharge of sewage in the river above from cities of Lethbridge and Calgary.
7. Filtered with mechanical filter. Results would be satisfactory had plant been properly equipped with loss of head gauges, etc.

RED DEER, Alberta. Population 2,500.

1. Combined.
2. Into Red Deer River below the town.
3. No. Plans under consideration.
4. None.
5. From Red Deer River.
6. None.

7. Water is filtered through a filtration basin of gravel and cinders before being pumped into mains. Water is very pure.

STRATHCONA, Alberta. Population, 3,000.

1. Combined.
2. Into North Saskatchewan River.
3. No. Expect to construct sewage disposal plant next year.
4. None.
5. North Saskatchewan River.
6. None.
7. Filtered through gravel beds into wells and pumped therefrom. Results satisfactory; water clear and of excellent quality. Analysis made some time ago.

WETASKIWIN, Alberta. Population, 3,000.

1. Combined.
2. Into Big Stone Creek, thence to Battle River.
3. Sewers only been in use a few months and disposal works are not yet completed. City expects to have modern plant next year.
4. None.
5. From three deep wells, approximately 225' in depth.
7. Water has been analysed.

STETTLER, Alberta.

1. No sewers.
5. Propose to obtain it from wells.
7. Not filtered.

NEW WESTMINSTER, British Columbia. Population, 11,000.

1. Separate. Main business section combined.
2. Discharge directly into Fraser River, which is 14 miles from sea.
3. No.
5. From Coquetlum Lake.

PRINCE RUPERT, British Columbia.

1. Separate. Domestic sewage only.
2. Pacific Ocean.
3. No.
5. A mountain stream on K Island supplies water by gravity.
6. Absolutely none.
7. No.

ROSSLAND, British Columbia. Population, 6,000.

1. Combined.
2. Into Trail Creek, thence to Columbia River. Rossland is situated 2,100′ above Columbia River.
3. Not treated nor purified.
5. From mountain creeks—Stony Creek and Rock Creek.
6. None.
7. Not filtered. No analysis has been made.

GREENWOOD, British Columbia. Population, 1,500.

1. None.
5. Domestic supply from Lind and Providence Creeks; Twin Creek for fire purposes.
6. Twin runs through town of Phœnix.
7. Not filtered. Analysis favourable.

GRAND FORKS, British Columbia. Population, 2,000.

1. No general sewerage. Public buildings, hotels, etc., have septic tanks.
5. From Kettle River.
6. Practically no sewage enters stream.
7. Water supply is pumped from filtering basin. No analysis has been made recently. Medical Health Officer claims water is excellent.

NELSON, British Columbia. Population, 6,500.

1. Combined.
2. Into Kootenay River.
3. No.
5. From small mountain lake fed by mountain streams.
6. No pollution known by health officials.
7. Water is not filtered or in other way purified.

CRANBROOK, British Columbia. Population, 1,200.

1. No sewerage system. Have plans for separate system large enough to drain pavements if built. Precipitation less than 15″. Very little surface water.
2. Sewers will discharge directly into St. Joseph's Creek.
3. No.
4. None.
5. From St. Joseph's Creek.
6. Supply taken from virgin forest area. Very slight chance of contamination from 4 or 5 residences above reservoir.
7. Water is not purified.

KAMLOOPS, British Columbia. Population, 1,600.

1. Separate. Carry domestic sewage only.
2. Through septic tanks then into the Thompson River.
3. Discharge into septic tanks which have not given any trouble.
4. Having tests made. Will advise later.
5. From the Thompson River which forms the N. boundary of the city.
6. No discharge of sewage above us.
7. Water not filtered.

VANCOUVER, British Columbia. Population, 60,000.

1. Both systems are in use, but practically all new work is laid on the combined system.
2. Into tidal waters.
3. Septic tanks were installed for the separate system, but no adequate provision having been made for disposal of sludge, most of the tanks have been abandoned.
5. Mountain streams.
6. No population above water intake.
7. Not required.
7. Not filtered. Result of analysis 9 to 13 chlorine in parts per million.

APPENDIX II.

Report of Committee on Sewage Disposal.

QUESTIONS:

1. *Does the law in your State distinctly forbid (from the date it was passed) emptying any unpurified sewage into rivers, streams, and lakes?*

2. *Regarding municipalities which, in the past, have been pouring crude sewage into rivers, streams, and lakes, has your Board been empowered to prevent them doing so?*

3. *Has either the law or your Board established any purification standards for sewage effluents?*

REPLIES:

Alabama—(1) No. (2) No. (3) No.
Connecticut—(1) No. (2) No. (3) No.
Florida—(1) Strong law. (2) Not answered. (3) Not answered.
Iowa—(1) No. (2) Board can forbid. (3) No.
Indiana—(1) Board can order. (2) Board can order. (3) No.
Kentucky—(1) No. (2) No. (3) No.

Kansas—(1) Yes. (2) Yes. (3) No.
Louisiana—(1) Yes. (2) No. (3) No.
Massachusetts—(1) 20 miles above city. (2) Legislature grants power. (3) No.
Missouri—(1) No. (2) No. (3) No.
Maine—(1) No. (2) No. (3) No.
Maryland—(1) Yes. (2) No. (3) No.
Montana—(1) Yes. (2) Yes. (3) Yes, 98%.
Michigan—(1) No. (2) No. (3) No.
Minnesota—(1) Yes. (2) Yes. (3) No.
New York—(1) Yes. (2) No. (3) No.
New Hampshire—(1) Yes. (2) No. (3) No.
North Carolina—(1) No. (2) Yes. (3) No.
New Jersey—(1) Yes. (2) Yes. (3) No.
Ohio—(1) No. (2) Yes. (3) No.
New Mexico—(1) Yes. (2) Yes. (3) No.
Pennsylvania—(1) Yes. (2) Yes. (3) No.
South Carolina—(1) No. (2) No. (3) No.
Tennessee—(1) No. (2) No. (3) No.
Vermont—(1) Board grants permission. (2) No. (3) No.
Virginia—(1) No. (2) No. (3) No.
Washington—(1) No. (2) No. (3) No.
Wisconsin—(1) Board investigates. (2) No. (3) No.
West Virginia—(1) No. (2) No. (3) No.

Canada:

Alberta—(1) Yes. (2) Yes. (3) Board controls.
Nova Scotia—(1) No. (2) No. (3) No.
Ontario—(1) Yes. (2) Yes. (3) No.
Saskatchewan—(1) Yes, Vol. 18, No. 4. (2) Yes. (3) Board establishes.

APPENDIX III.

(Report of Committee on Sewage Disposal.)

Extracts from the Provincial Health Acts.

PRINCE EDWARD ISLAND:

Section 22 of the Public Health Act forbids anyone, unless specially licensed, placing "on land or water any offensive matter or thing likely to endanger the public health," but has no law relating specifically to sewage disposal.

NOVA SCOTIA:

Art. 58. No person shall put in any place on land or water any offensive matter or thing likely to endanger the public health.

Art. 65. When the establishment of a public water supply or sewerage system is contemplated by the council of any city or town, or by any corporation, such council or corporation shall submit all plans in connection with such supply or system to the Governor-in-Council. No work shall be commenced until the plans have been approved.

QUEBEC:

3909. No municipality shall take or allow proceedings, and no corporation, company, or person shall take proceedings to carry out public or private drainage works before submitting the plans to the Provincial Board of Health and obtaining its approval.

3911. Every person who knowingly and voluntarily soils or contaminates in any manner whatever the water of a well, spring, stream, lake, pond, river, or reservoir, used for drinking by men or animals, and every person who voluntarily soils or contaminates the intake of any aqueduct, whether such intake be frozen or not, and every person who deposits in such intake or upon the ice thereof the carcase of any dead animal or any other matter injurious to health, is liable to a fine not exceeding one hundred dollars, and in default of payment to imprisonment not exceeding two months.

ONTARIO:

Approval of Provincial Board to Establishment of Sewerage System. Sec. 30. (2) Whenever the construction of a common sewer or of a system of public sewerage is contemplated by the council of any city, town, or village, it shall be the duty of the council to place itself in communication with the Provincial Board of Health, and to submit to the Board before their adoption all plans in connection with said sewer or sewerage system. It shall be the duty of the Provincial Board of Health to inquire and report upon

said sewer or system of sewerage, as to whether the same is calculated to meet the sanitary requirements of the inhabitants of the municipality; and as to whether such sewer or system of sewerage is likely to prove prejudicial to the health of the inhabitants of the municipality or of any other municipality, liable to be affected thereby. 58 V., c. 49, s. e (2).

Amendment of Plans at instance of Provincial Board of Health. (3) The Provincial Board of Health may make any suggestions or amendments concerning the plans submitted, or may impose any conditions with regard to the construction of such sewer or system of sewerage, or the disposal of sewerage therefrom, as it may deem necessary or advisable in the public interest; and the construction of any common sewer or system of sewerage shall not be proceeded with without being reported upon and approved of by the Provincial Board of Health, and no change in the construction thereof or of the disposal of sewage therefrom liable to injuriously affect the public health shall be made without previous submission to and approval by the said Board. 58 V., c. 49, s. e (3).

MANITOBA:

The Public Health Act, section 28, requires that plans for the establishment of water supply and sewerage systems shall be submitted to the Provincial Board of Health before adoption.

There are apparently no laws dealing specifically with sewage disposal or stream pollution.

SASKATCHEWAN:

The Public Health Act provides for a permanent Bureau of Public Health, the chief officer of which, who must be a duly qualified medical practitioner, is known as the Commissioner of Public Health.

The clauses relating to sewage disposal are as follows:

Sewage Disposal. (2) No common sewer or system of sewerage shall be established or continued unless there is maintained in connection therewith a system of sewage purification and disposal which removes and avoids any menace to the public health, and the Commissioner may call for, and any council, person, or body corporate shall, when requested, furnish as soon as may be, such information and data in relation to such matters under their control as the Commissioner may deem necessary; provided that, with regard to systems in operation at the date of the passing of this Act, the Commissioner may dispense with the requirements hereof for a sufficient time in his opinion to permit of compliance therewith.

(3) It shall not be lawful for any such council, person, or body corporate to construct, alter, extend, or operate any common sewer or systems of sewerage or sewage disposal without first obtaining from the Commissioner a certificate stating that the proposed construction, alteration, or extension may be carried out, and the constructed or extended common sewer or systems of sewerage and sewage disposal maintained and operated without injury or danger to the public health.

Consent of Commissioner to certain By-laws necessary before submission to Voters. 23. No by-law providing for the raising of money for the construction, operation, or extension of any system of water-works or common sewer or system of sewerage or sewage disposal shall be submitted to the votes of the electors by the council of any municipality until the consent of the Commissioner to the proposed construction, operation, or extension has been first obtained under the provisions of sections 21 and 22 hereof, as the case may be, and the preamble to every such by-law shall declare that such consent has been duly obtained; no debenture shall be valid if issued under any by-law passed in contravention of the provisions of this section.

The Commissioner may, subject to the approval of the Lieutenant-Governor-in-Council, make and issue such rules and regulations as he may deem necessary, among other things, for "the prevention of the pollution, defilement, discolouration, or fouling of all lakes, streams, pools, springs, and waters as to ensure their sanitary condition. . . ."

ALBERTA:

Sewage Disposal. (2) No common sewer or system of sewerage shall be established or continued unless there is maintained in connection therewith a system of sewage purification and disposal which removes and avoids any menace to the public health, and the Provincial Board may call for, and any council, person, or body corporate shall, when requested, furnish as soon as may be, such information and data in relation to such matters under their control as the Provincial Board may deem necessary; provided that, with regard to systems in operation at the date of the passing of this Act, the Provincial Board may dispense with the requirements thereof for a sufficient time in their opinion to permit of compliance therewith.

(3) It shall not be lawful for any such council, person, or body corporate to construct, alter, extend, or operate any common sewer or system of sewerage or sewage disposal without first obtaining from the Provincial Board a certificate signed by the Chairman stating that the proposed construction, alteration, or extension may be carried out, and the constructed or extended common sewer or

system of sewerage and sewage disposal maintained and operated without injury or danger to the public health.

British Columbia:

Section 24 of the Health Act provides that plans for the construction, alteration, or extension of any water-works or sewerage system must be submitted to the Provincial Board of Health, whose certificate that the proposed system may be maintained and operated without injury or danger to the public health is necessary before proceeding with construction. One of the regulations of the Provincial Board of Health requires that "no solid or liquid sewage matter from either public or private sewers shall be discharged into any stream or lake, but if it can be proved that the best means have been adopted to purify the sewage, etc., before it enters the stream or lake no offence is committed. . . ."

Report of the Committee on the Usefulness of the Society and Educational Requirements.

In its reports of 1909 and 1910 this Committee had made a number of recommendations and suggestions, a few of which only have been dealt with by the Society.

It is thought advisable, at this stage, to refer both these reports to the present Annual Meeting for further discussion of such of the suggestions and recommendations upon which no decision has so far been arrived at.

This Committee is also of the opinion that better results would be obtained, in respect of the objects for which it was created, if several local committees were appointed by the Annual Meeting, with instructions to each of them to deal with these objects, either *in toto* or in part.

With regard to qualifications for admission into the Society, the Committee recommend:

1. That By-Law No. 10, concerning the admission of students, be rigidly enforced.

2. That, in case of any doubt as to the qualifications of applicants for admission to any grade below that of membership, the Council be instructed to prescribe and conduct the necessary examinations; this new regulation to be embodied in a By-Law to be voted on before the next Annual Meeting.

ERNEST MARCEAU,
Chairman.

Report of the Committee on the International Electro-Technical Commission.

The Canadian National Committee of the International Electro-Technical Commission held two meetings during the past year. The members of this Committee for the year 1910 were:

Dr. H. T. Barnes, Montreal.	W. A. Duff, Winnipeg.
Dr. L. A. Herdt, Montreal.	O. Higman, Ottawa.
J. L. Stiver, Ottawa.	Prof. L. W. Gill, Kingston.
John Murphy, Ottawa.	Prof. R. F. Roxburgh, Toronto.
J. J. Wright, Toronto.	A. B. Lambe, Ottawa.

At a meeting held in March, in Ottawa, the following officers were elected for the year 1910:

L. A. Herdt, President.
O. Higman, Vice-President.
J. L. Stiver, Secretary.

National Committees are now formed in Germany, Denmark, France, Italy, Spain, United States, Great Britain, Hungary, Japan, Mexico, Sweden, and Uruguay.

Different propositions with regard to nomenclature and standardization were submitted from different committees, and reported upon to the central office in London. Considerable correspondence has passed between the Canadian Committee and the central office of the Commission.

The next meeting of the Commission is to be held in Turin, Italy, in September next, and it is hoped that Canada will be represented by one member of the local committee.

L. A. HERDT,
Chairman.

Report of the Committee on the Improvement of the Government Engineering Service.

At the last Annual Meeting a Committee was named to consider questions relating to the Improvement of the Government Engineering Service, and the subject has been under discussion and consideration by your Committee, and also by another Committee in Ottawa formed of members of the Society who are in the employ of the Federal Government.

A draft bill for submission to Parliament was prepared and submitted to the Ottawa members, who, after amending it, referred it to your Committee.

This bill was prepared with a view to the improvement of the status of the engineer in the Government employ and copies of it were given to the Ministers for their consideration.

No definite expression of opinion has been received from the Ministers, and we do not know what position they will take towards this bill. We are assured, however, that we have the sympathy of the Ministers in the general idea of the bill, but the details will have to be further considered.

At the last meeting of the Committee, Mr. H. J. Lamb, who had come from Ottawa for the purpose of attending the meeting, and who had been in close touch with the engineers at Ottawa in regard to this matter, reported that it was not the desire of the Government engineers that this Committee take any definite or positive action at the present moment, and that a representative from the Ottawa engineers would meet the Council to fully explain their views.

Mr. Lamb presented a copy of this bill, which was discussed at our meeting, and it was felt that in its present form the bill does not express fully what is required, and that the subject should be very fully discussed at a meeting which should be held at Ottawa, where most of those immediately interested reside, and at an early date.

It was felt that a clear statement of the points to be covered should be made and decided upon, after which a competent person should draft a bill for Parliament.

The Committee is in full sympathy with the matter, and feels that while it desires to assist in the work, yet the members who are more immediately interested in the subject are best informed as to their requirements, and are better able to discuss details with the Ministers from time to time. They are also in a better position to advance the matter than the Committee is, and the work begun by them should be continued, the Society giving any possible assistance.

A suggestion of importance was made to the effect that the bill should provide for the establishing of a board of consulting engineers, who should pass upon all public works plans. No suggestion was made as to the composition of such a board, except that the engineering heads of the departments should be members of it. It was considered that such a board would be a distinct advantage to the Government, and it is recommended that the Ottawa engineers consider this point.

I would suggest that the present Committee be discontinued, and that a Committee of Ottawa members be formed to deal with the matter, in consultation with Council, and that the Council and members generally give every assistance to insure a solution of the problem satisfactory not only to the engineers themselves, but to the Government also.

HENRY HOLGATE,
Chairman.

Montreal, January 14th, 1911.

DISCUSSION ON THE REPORT OF COUNCIL.

Col. Anderson — COL. W. P. ANDERSON.—I beg to move that the Report of Council as printed and distributed be received and adopted.

Dr. Galbraith — I beg to second the motion.

Motion carried.

The President — The Report of Council is now open for discussion.

The Secretary — I might say that in regard to the Committees there is an omission on page 4—beginning on page 3, "the following have been the Committees of Council during the year: Library and House Committee, Finance Committee, the Gzowski Medal Committee." That ends the Committees of Council. The rest are Committees of the Society.

The President — You have heard the motion. Are you ready for the question?

Motion carried unanimously.

The next order of business is receiving the report of the Library and House Committee.

Mr. Mountain — MR. G. A. MOUNTAIN.—I move that the report of the Library and House Committee be received and adopted.

Mr. Rust — MR. C. H. RUST.—I second that.

Motion carried.

The President — The next matter is receiving and considering the Report of the Finance Committee.

Mr. Lamb — MR. H. J. LAMB.—I would move that this report be received and adopted.

Mr. Mountain — I second that motion.

Motion carried.

The President — The next order of business is receiving the Reports of Branches.

The report of the Quebec Branch was read by Mr. Oliver, Secretary of the Branch.

REPORT ON THE ANNUAL PROCEEDINGS OF THE QUEBEC BRANCH, CANADIAN SOCIETY OF CIVIL ENGINEERS.

We have the honour to report that since the 21st January, 1910, the date of the last Annual Meeting, the Quebec Branch of the Canadian Society of Civil Engineers has held ten meetings for general purposes and for the election of new members.

This Branch has at present a membership of 49 corporate members, 4 Students, and 2 Associates.

I regret to say that during the year no papers were read before this Branch. This may be due to a certain extent to the fact that most of our members are compelled, by their professional duties, to be absent from Quebec for a great part of the year. A great deal of interest, however, has been manifested in the doings of the engineer-

ing profession, and discussions have been frequently held on important works which are now in course of construction.

On several occasions members of the Branch have discussed the advisability of stricter measures being taken to enforce the payment of dues to the parent Society, and representations have been made to this effect, as it is felt that such enforcement would then enable the parent Society to make the necessary rebates to the Branches in order to put them on a proper footing to enable them to carry on the work of holding the members together, and for the benefit of the Engineering Society at large.

It is also felt that the members of the Society in the Province of Quebec do not enjoy the protection to which they are entitled and have a right to look for according to the Charter of the Society. In many cases it has been brought to the attention of the Quebec Branch of the Society that engineers who do not belong to the Canadian Society of Civil Engineers have been brought in from foreign countries to carry on important engineering works, which, it is felt, would have been equally as well looked after by Canadian engineers, members of the Society.

It is generally felt among the members of the Quebec Branch that stricter measures should be taken to enforce the carrying out of our By-Laws, which provide that no engineer, not a member of the Canadian Society of Civil Engineers, although such may be a graduate of some university, is entitled to call himself or to practise as an engineer in the Province of Quebec without complying with the By-Laws.

The Quebec Branch has very comfortable rooms, which have been placed at its disposal by the Mayor of Quebec. The leading engineering reviews and magazines are at the disposal of the members of the Branch. A library has been started, to which the members have free access at all times of the day.

The annual meeting of this Branch was held on the 10th January, 1911, at which Mr. P. E. Parent was elected Chairman and Mr. S. S. Oliver, Secretary-Treasurer, to replace Mr. A. E. Doucet, retiring Chairman, and Mr. P. E. Parent, the retiring Secretary-Treasurer.

Messrs. A. R. Decary, W. R. Russell, and R. O. Sweezey were elected members of the Executive Committee, as well as E. A. Hoare, L. A. Vallee, and A. E. Doucet, who, as past Chairmen, formed part *ipso facto* of this Committee.

(Signed) A. E. DOUCET,
Chairman.

(Signed) P. E. PARENT,
Secretary.

MR. S. S. OLIVER.—I move that the report of the Quebec Branch be adopted. Mr. Oliver

MR. R. F. UNIACKE.—I second the motion. Mr. Uniacke

Motion carried.

The President — The next report is from the Ottawa Branch.

Report was read by Mr. James White.

ANNUAL REPORT OF OTTAWA BRANCH FOR YEAR 1910, CANADIAN SOCIETY OF CIVIL ENGINEERS.

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen,

The Managing Committee of the Ottawa Branch of the Society begs to make the following report for the year 1910:

Membership.—The total membership of the Branch at the close of the year was 228, of which 4 were Honorary Members, 47 Members, 88 Associate Members, 1 Associate of the main Society, 20 Associates of the Ottawa Branch, and 68 Students.

We regret to record the death of: Z. J. Fowler, Member; G. C. Rainboth, Member; J. B. Spence, Member.

Annual Meeting.—The annual meeting of the Branch was held on the 5th October, and the following officers were elected for the year 1910-11:

Chairman—A. A. Dion.
Secretary-Treasurer—H. Victor Brayley.
Managing Committee—S. J. Chapleau, J. E. N. Cauchon, Gordon Grant, John B. McRae, James White.

Meetings.—The following papers, lectures, etc., were given during the year:

April 13th, Mr. W. J. Stewart, M. Can. Soc. C. E., in the chair. Paper by Mr. James McArthur on "The Use of the Camera in Topography."

April 20th, Mr. J. E. N. Cauchon, A. M. Can. Soc. C. E., in the chair. Paper by Mr. W. H. Breithaupt, M. Can. Soc. C. E., on "Grade Separation," which was presented by Mr. Geo. A. Mountain, M. Can. Soc. C. E.

April 27th, Mr. C. R. Coutlee, M. Can. Soc. C. E., in the chair. Paper by Mr. James White, M. Can. Soc. C. E., on "The Water Powers of Ontario."

May 4th, Mr. J. E. N. Cauchon, A. M. Can. Soc. C.E., in the chair. Paper by Mr. C. R. Coutlee, M. Can. Soc. C. E., on "The Present and Future of the Ottawa River."

May 11th, Lieut.-Col. W. P. Anderson, M. Can. Soc. C. E., in the chair. Paper by Mr. W. J. Dick, M.E., on "The Mineral Resources of Canada."

May 18th, Mr Samuel Bray, M. Can. Soc. C. E., in the chair. The paper by Mr. H. Sydney Hancock, Jr., A. M. Can. Soc. C.E., on "The Fort William Water Supply," was presented.

May 25th, Mr. C. R. Coutlee, M. Can. Soc. C. E., in the chair. Paper by Mr. R. F. Uniacke, M. Can. Soc. C. E., on "Bridges, in reference to those on the N.T. Ry."

September 21st, Mr. R. F. Uniacke, M. Can. Soc. C. E., in the chair. Paper by Mr. J. E. N. Cauchon, A. M. Can. Soc. C. E., on "The C.P. Ry. Proposed Tunnel in Ottawa."

September 28th, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Paper by Major G. S. Maunsell, A. M. Can. Soc. C. E., on "Aviation."

October 20th, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Paper by Mr. S. B. Johnson, A.M.Can.Soc.C.E., on "Stream Metering."

November 9th, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Paper by Mr. John Murphy, A. M. Can. Soc. C. E., on "Reasonable Methods of Handling Frazil at Hydraulic Works."

November 23rd, Mr. James White, M. Can. Soc. C. E., in the chair. Paper by Mr. Geo. B. Hull, A. M. Can. Soc. C. E., on "Irrigation in Western Canada."

November 30th, Mr. J. E. N. Cauchon, A. M. Can. Soc. C. E., in the chair. Paper by Mr. A. R. Dufresne, M. Can. Soc. C. E., on "The St. Andrew's Locks and Dam."

December 7th, Mr. C. R. Coutlee, M. Can. Soc. C. E., in the chair. Mr. R. W. Leonard, M.Can. Soc. C. E., addressed the Branch on "The Past and Future of the Cobalt Camp." The papers by Mr. John A. Shaw, B.Sc., A.M. Can. Soc. C.E., on "Power Plant Practice," and Mr. H. M Burwell, M. Can. Soc. C. E., on "New Water Supply for the City of Vancouver, B.C.," were presented at this meeting.

December 21st, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Address by Mr. A. W. Campbell, M. Can. Soc. C. E., on "Public Roads."

Other meetings were held as follows:

January 7th, Mr. W. J. Stewart, M. Can. Soc. C. E., in the chair. Discussion on Report of Committees of the main Society to Annual Meeting. Arrangements for Annual Meeting.

March 9th, Mr. W. J. Stewart, M. Can. Soc. C. E., in the chair. Business meeting. Recommendations to Council for new class of Junior; increase of refunds and fees. Discussion on motions received from the Quebec Branch, and report upon same.

March 23rd, Mr. Morley Donaldson, M. Can. Soc. C. E., in the chair. Business meeting. Discussion on Branch dinners; on inviting the American Society of Civil Engineers to hold their Summer Convention in Ottawa during the month of June.

October 26th, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Business meeting. Motion asking Council to amend By-Laws to be voted on previous to Annual Meeting in January.

November 2nd, Mr. A. A. Dion, M. Can. Soc. C. E., in the chair. Business meeting *re* dinners, papers, and entertainments.

Informal Dinner.—Held at King George Hotel, 16th November. Thirty-eight were present.

Attendance.—The attendance at the meetings varied from 15 to 87, with an average of 26. The interest taken in the Branch and the Society has been on the increase during the year, and it has been a surprise and a pleasure to the Managing Committee to note the great zeal shown by the members of the Branch.

Finance.—It is found that the necessary expenditure of the Branch, such as rent, light, caretaking, library, postage, printing, etc., requires about $650.00 per annum.

The Branch at the end of the year has a deficit of $175.00. The Branch lost refunds for 1909 on over 23 Corporate Members, owing to the present system of making credits to branches. It also lost refunds for 17 more members owing to arrears. We received in 1910 refunds for 117 Corporate Members out of 131 Corporate Members. A subscription of $2.50 was asked from all Corporate Members towards furnishing the rooms of the Branch. This received a generous response.

Library.—A library has been started by subscribing to the Technical Press and by donations from individual members of the Branch. The former is limited owing to the pressing demands on the funds of the Branch for the cost of rooms and general running expenses, etc. Much has been obtained from individual members, but lack of space forbids a detailed report at present.

Rooms.—The headquarters of the Branch is situated at 117 Sparks Street, and is open to all members of the Society. It is hoped that visiting members will make use of these rooms, as they have the same privileges as resident members. Wednesday evening is the meeting night of the Branch. If no papers are being read, members generally drop in to smoke and chat. The rooms of the Branch are well furnished, and while they seemed large enough a year ago, are now quite too small. We should get into larger quarters as soon as our finances will admit of the necessary expenditure.

We would strongly recommend a better system of making refunds to Branches. Payments should be made at least three times a year, at regular intervals. Refunds should be made for every member who has paid his fees at the time of such refund, in accordance with the published list of members sent out by the head office each year.

We recommend that the Council devise some means whereby assistance be given to Branches to form local libraries, in order that members of Branches may derive benefits similar to those of resident members in Montreal.

We recommend that papers of merit read before Branches be published in the *Transactions* of the Society when desired by the Branch, subject to censorship at headquarters, instead of compelling authors to read at Montreal first in all cases.

We recommend that the mode of election of officers and Council be considered, with a view of giving Branches representing the various districts some voice in the selection of the members of the Nominating Committee.

All of which is respectfully submitted.

(Signed) A. A. DION,
Chairman.
(Signed) H. VICTOR BRAYLEY,
Secretary.

MR. J. WHITE.—I beg to move the adoption of the report. Mr. White

I have pleasure in seconding the motion. Mr. Mountain

Motion carried.

The next Branch report to be considered is that of Toronto. The President

Mr. T. C. Irving, Jr., read the report.

ANNUAL REPORT OF THE TORONTO BRANCH,
CANADIAN SOCIETY OF CIVIL ENGINEERS.

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen,

The Executive of the Toronto Branch beg to submit the following report for the year 1910:

The total membership of this Branch at the close of the year was 275, of which 60 were Members, 87 Associate Members, 7 Associates, and 121 Students. These, according to the Constitution, represent the members of the Society within a radius of 50 miles of Toronto. Due to removals, deaths, and the non-payment of dues, only 86 members are on the contributing list, so that this Branch has derived from the parent Society $172 as a refund during the current year.

We regret to record the deaths of Messrs. John Galt, C. E. Goad, and George Masson.

The members of the Branch have, by an arrangement continued from previous years, had the privileges this year of the rooms of the Engineers' Club of Toronto. Because of the launching of the new organization, which is to become the successor of the Club just

referred to, it will be necessary for the incoming Executive to make other plans for its quarters for the year 1911.

As in previous years, the meetings were limited to one each month during the winter season. All but two were held at the headquarters of the Branch, 96 King Street West.

The papers read were as follows:

"The Detroit River Tunnel," by W. S. Kinnear.
"The Hydrostatic Chord," by R. D. Johnson.
"Grade Separation," by W. H. Breithaupt.
"Bridge and Building Foundations," by T. K. Thomson.
"The Toronto Sewage Disposal Works," by A. C. D. Blanchard.

It will be observed that the policy of the Executive has been to secure addresses from eminent engineers from this and other cities, in addition to the usual discussions of papers delivered before the parent Society.

The question of securing the importation of technical magazines for individual members of the Branch through other channels than the mails has been under consideration, and some progress toward the solution of this problem has been made.

The following officers have been elected for 1911:

Chairman—Professor H. E. T. Haultain.
Secretary—A. C. D. Blanchard.
Executive—T. C. Irving, Jr., P. Gillespie, E. A. James, W. E. Douglas, and G. G. Powell.

The Auditors' report shows a balance on hand of $125.08.

(Signed) A. W. CAMPBELL,
Chairman.
(Signed) P. GILLESPIE,
Secretary-Treasurer.

Mr. Irving MR. T. C. IRVING, JR.—I move the adoption of the report.
Mr. Dill MR. C. W. DILL.—I beg to second the motion.
Motion carried.
The President The next is the report of the Manitoba Branch.
The report was read by Prof. E. Brydone-Jack.

ANNUAL REPORT OF THE MANITOBA BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS FOR THE YEAR 1910.

The Manitoba Branch of the Canadian Society of Civil Engineers begs leave to submit the following annual report for the year 1910:

The officers for the year 1910 were as follows:

Chairman—J. E. Schwitzer.
Executive Committee—C. H. Dancer, J. A. Hesketh, T. Turnbull, Col. H. N. Ruttan.
Secretary-Treasurer—E. E. Brydone-Jack.

Meetings.—The following papers were discussed at the regular meetings of the Branch:

November 4th, 1909, "The Power Plant of the City of Winnipeg," by W. G. Chace.
January 6th, 1910, "The Design and Construction of the Lethbridge Viaduct," by J. E. Schwitzer.
February 3rd, 1910, "The St. Andrew's Locks and Dam," by A. P. Dufresne.
April 14th, 1910, "Wireless Communication," by Dr. Lee de Forrest.

Attendance.—The attendance at these meetings averaged about 30.

The annual meeting of the Branch was held December 1st, 1910, at which the following officers were elected:
Chairman—C. H. Dancer.
Executive Committee—E. P. Fetherstonhaugh, J. A. Hesketh, T. Turnbull, J. E. Schwitzer and Col. H. N. Ruttan.
Secretary-Treasurer—E. E. Brydone-Jack.

Members in the Branch.—The total number on the mailing list of the Branch is 166.

Recommendations.—The members of the Branch wish to recommend that the By-Laws of the Society be revised so that papers which have been read before the Branches of the Society may be published in the *Transactions*, providing the Council considers them worthy of publication.

(Signed) CHAS. H. DANCER,
Chairman.
(Signed) E. E. BRYDONE-JACK,
Secretary-Treasurer.

Prof. Brydone-Jack

PROF. E. E. BRYDONE-JACK.—I move the adoption of the report.

Mr. Dancer

MR. CHAS. H. DANCER.—I second the motion.

Motion carried.

The President

The next report is that of the Vancouver Branch.

I have not received a report from the Vancouver Branch. I do not know if there is anybody representing it here.

(The following report was received after the date of the meeting):

VANCOUVER BRANCH,
CANADIAN SOCIETY OF CIVIL ENGINEERS.

The Vancouver Branch reports:

Officers for 1910:

Chairman—Geo. H. Webster.
Secretary-Treasurer—H. K. Dutcher.
Executive Committee—H. J. Cambie, Jas. F. Garden, T. H. Tracy.

Regular meetings were held monthly through the winter season. Papers read included the following:

(1) "Organization and Cost-keeping as Practiced by a Railway Company," F. P. Wilson.

(2) "Influence of Light on Concrete Pipe," Wm. Dart.

(3) "Organization of City Engineer's Department," J. H. Kilmer.

At the annual meeting, held November 4th, 1910, the following officers were elected for 1911:

Chairman—Geo. H. Webster.
Secretary-Treasurer—H. K. Dutcher.
Executive Committee—C. E. Cartwright, J. C. Kennedy, H. A. Bayfield.

The membership of this Branch is now 45. Of this number 23 are Members and 22 Associate Members.

Meetings are held in the Board of Trade Rooms, but the intention is to have permanent quarters for the Branch, either in conjunction with the architects of the city, or to have a suite of rooms entirely for the use of the Branch. To accomplish this it will be necessary to tax the members of the local Branch, in addition to the grant from the Society, which is inadequate. In view of the requirements and convenience to visiting members of the Society, permanent quarters, to include reading rooms and library, should be provided, and it is hoped that an increased grant will be made.

During the past year the work of the Branch has already made itself effective in directing the attention of the provincial and municipal authorities to the available services of local engineers in connection with engineering work in the Province.

H. K. DUTCHER,
Secretary-Treasurer.

When does the business arising from the suggestions and resolutions of the Branches just read come up for discussion, or does it come up for discussion at this meeting? Mr. Mountain

I may say, in answer to Mr. Mountain, that I think those reports should have been discussed, if there were to be any discussion, while they were before the meeting. There is no objection to opening up the matter again to permit of any discussion which the meeting likes to give on the various reports. The President

I should like to ask if it is intended to publish those reports. It appears to me a good many valuable suggestions to the Society are embodied in them, and they might be put before the members so that they could consider them at their leisure. I would move that they be incorporated in the *Transactions*, and I would also move that the several suggestions contained in the reports of the Branches be referred to the incoming Council for consideration. Col. Anderson

The Secretary informs me that the reports are always published in the *Transactions*. The President

On motion by Col. Anderson, seconded by Mr. Mountain, it was resolved that the reports of the various Branches be referred to the incoming Council for consideration.

Motion carried.

Do I understand by this that there is to be no discussion—that they are simply to be referred to the incoming Council? Mr. White

That is the effect of the motion that has been carried, but there is no objection to discussion on the reports now, if the meeting desires it. The President

I would like to say a few words on behalf of the Ottawa Branch, particularly with respect to the question of refunds. Mr. White

We had a considerable deficit this year, and the result has been that the Managing Committee has had to shoulder the responsibility of carrying that deficit. According to the By-laws, the meetings begin on the 1st of January, but the payments are not to be made until the close of the year. That means a Branch will have to finance itself for practically twelve months. We think payments should be made at least three times a year, or, preferably, quarterly. I understand the objection has been raised that this would involve a great deal of labour and complication. I do not see why, on the 1st of January, a list of members of each Branch cannot be prepared, and, as each of the members, say, of the Ottawa Branch, pays his fees, the Branch should be duly credited. Unfortunately, one is unable at this meeting to make any amendment to the By-Laws. I would like to know if there is not some way, by instruction to Council or otherwise, whereby we can have those payments made as I propose, either three or four times a year.

The President — I would ask the Secretary to explain the practice in respect to the payments to Branches.

The Secretary — While the By-Law reads as Mr. White states, the Council has given an instruction that advances be made on account practically at the convenience of the Branches, and each one of the Secretaries has been notified to that effect. Last year, for example, there was an advance about the 1st of May, as I recollect, to the Ottawa Branch of $75. Then, during the summer, about the 1st of August, there was another advance of $75, and later on, near the end of the year, the balance was paid. If this is not satisfactory, larger advances can be made, but we do not want to overpay the amount that is likely to be to the credit of a Branch at the end of the year.

Mr. White — As I understand it, while the By-Law reads one way the practice is the other way.

The Secretary — The By-Law reads that the final settlement is to be made on the basis of membership at the end of the year. Payments are made in advance. We really do not know until the 31st of December what the total credit to the Branch may be.

Col. Anderson — Are the Branches credited with the payments made at the close of the year, or do they lose the arrears absolutely?

The Secretary — Under the new By-Law they would be credited with all payments made during the next year. That is, in 1911 Branches will be credited with arrears paid for 1910.

Mr. White — Of course, so long as, in practice, we get our refunds at stated intervals, it is quite satisfactory; but I confess the Managing Committee of the Ottawa Branch, on reading over the By-Laws, did not draw that inference from them. The way the By-Laws are drawn would seem to leave it open to the Secretary to refuse to pay anything during the year.

The Secretary — I explained in several letters to the Secretary of the Ottawa Branch what the resolution of the Council was under which we were acting, and he certainly had the letters in his hands.

Mr. Uniacke — One thing that came up in the Ottawa Branch, which I do not think was covered by Col. Anderson's motion, was that a paper read at a Branch be recorded in the *Transactions* of the Society. On one occasion we had a most valuable paper read before the Ottawa Branch, and it was resolved that, as the paper was of such general interest to engineers throughout Canada, it should be published in the *Transactions*. The reply from the Secretary was, I understand, that it could not be published owing to the fact that the By-Laws require that it be read simultaneously at the head Society and at the Branch. I would be very much in favour of any revision of the By-Laws which would permit a paper of such general interest to be published in the *Transactions* of the Society.

The President — There should be no practical difficulty, under the existing By-

Laws, in obtaining publication of papers read before the Branches, the necessary condition being that such paper be sent in to the head office for approval by the Committee on Papers before it is read at a Branch. An arrangement could easily be made whereby, technically at least, simultaneous reading could be provided.

Mr. Uniacke

The paper to which I particularly referred was by Mr. Murphy on "Frazil Ice," and was illustrated by lantern slides. Some new points were brought out in this paper, and although it was prepared particularly for the Branch, I do not see why it could not be printed in the *Transactions.*

Dr. Galbraith

These difficulties seem to be peculiar to our Society, and there is nothing, so far as I know, in the practice of the Institution of Civil Engineers which might aid us in this matter. As the number of Branches and papers increase we shall probably have to devise some new method. It will be practically impossible for every paper to be read at headquarters and simultaneously or otherwise at the Branches. We shall not be able to utilize half or a quarter of the good papers, and I think the Council should take the whole question into consideration.

Prof. Brydone-Jack

I think there have been some very valuable papers read at the meetings of the Manitoba Branch. Although brought forward in lecture form, they would be extremely valuable to the Society. Under the present regulation we are not able to have them published, and I think the Society thereby loses some very important papers. It seems to me that some arrangement must be made whereby these papers may be read at the Branch and then referred to the main Society for publication if the Council considers them worthy. A paper is very seldom completely ready until the date of the meeting of the Branch at which it is to be read, so that if the paper had to be sent to Montreal first and be passed on there, and then returned to Winnipeg, it would be so late that the members of the Branch would not care to have it. I would recommend that this matter be given very careful consideration by the incoming Council.

Mr. White

Prof. Brydone-Jack has expressed admirably the views of the Ottawa Branch. We have no idea of asking the parent Society to publish all the papers; only the important ones should be published.

Col. Anderson

I think the feeling is very strongly in favour of the proposition of Mr. Uniacke and Prof. Brydone-Jack. In my opinion, the Canadian Society of Civil Engineers is suffering in comparison with the Institution of Civil Engineers because it is not publishing as good papers or as many papers, and we are not really giving any consecutive record of the great engineering works that are being executed in Canada in such form that they can be preserved for permanent record. The reason is that, as a rule, we are too busy to write papers, but a great many papers have been presented to the

Branches containing either original investigations or records of big works. Mr. Murphy's paper on "Frazil Ice" is most valuable, and it would be an advantage to the Society if it had been recorded for future reference. Mr. Schwitzer's paper on the "Lethbridge Viaduct" is a monumental work, and it is not recorded in any permanent form. If it is the opinion of the majority of this meeting that the incoming Council should take cognizance of the best of the work that is done by the Branches, I think we ought to say so with no uncertain voice. I would suggest that Mr. Uniacke move a resolution to that effect, and that Prof. Brydone-Jack second it.

The President

I might say, gentlemen, that I think we are all satisfied that for some reason or another we are not publishing a sufficient number of papers to indicate the character and the importance of the work being done in Canada. There are several reasons for this. The principal one, I think, is the formal and cumbersome method at present in use by the Society of introducing and publishing these papers. It is a comparatively easy matter to get a man to spend a week or two in preparing a paper to read before a local Branch, and while a great many of those papers no doubt would be rejected if they were sent to the parent Society, at the same time a great many very valuable papers might be published in our *Proceedings*. It appears to me that the Branches are breeding grounds, as it were, for papers, and if we can do something to facilitate the bringing of those papers before the Society, while they might be first in the form of lectures, still, if they were to be published, the people presenting them might prepare them more carefully.

Mr. Uniacke

I beg leave to move the following resolution: "That the incoming Council be instructed to take such action as to facilitate the reproduction in the *Transactions* of the Society of papers read before the Branches of the Society, which may be considered to be to the general interest of engineers."

In commenting on that resolution, I may say that, after a paper has been read at a Branch, it might be well for a resolution to be passed at that Branch that the paper is of general interest and be transmitted to the Council for their further action in the matter.

Prof. Brydone-Jack

I have much pleasure in seconding that motion.

Mr. John Kennedy

Could there not be some arrangement for the reading of the paper before the main Society also? The Branches have progressed very rapidly and are doing a great deal of good, even more good than was expected. Of course, we have hardly the means to record everything done by them, but surely some arrangement can be made for the reading of the principal papers at the main Society as well as for their publication.

So far as the support of the Society in general is concerned, it seems to me that the Branches must really face their own deficits.

If they keep up rooms and a library and publications, and keep them in vigorous condition, it is necessary to have someone to look after them, all of which will involve more expense than can be very well provided for by the main Society. It would practically mean the supporting of societies all over the country. It would therefore seem to be necessary that Branches should supplement the amount returned by the main Society by some contributions of their own. I think the resolution to reconsider the whole question will put matters right. Dr. Galbraith has referred to the Institution of Civil Engineers. I am sure that it has no Branches at all, and in that respect we are in advance of it and of the American Society too. The latter Society is copying us to some extent, and has what it terms "sections" recently established, but our Society has, I think, inaugurated the system.

Dr. Galbraith

I might point out that there are two different styles of lectures, both of which are useful and popular. One, the lantern slide lecture, which can be got up quickly, and is most interesting to an audience; the other, the lecture that is suited for printing, with its necessary illustrations. I think that every lecturer, if he wishes to be reported, should prepare a paper for the Society, even although he may not read that paper word for word in the Branch.

Motion carried unanimously.

The President

The next order of business is the reports of committees. The first is the Report on Ties.

Mr. MacPherson

Mr. D. MacPherson.—As this report of the Committee on Ties was printed and distributed to the members some time ago, I do not think I can add anything to it. I will simply present the report for discussion.

Mr. Mountain

I would like to ask the Committee what induced them to go into this question or who recommended these long ties, and from what experience they had derived this information. I just want to get the views of the Society on it.

Mr. MacPherson

In answer to Mr. Mountain, I would say that we have not recommended the immediate adoption of 10′ 6″ ties, but are rather experimenting with or testing them, with a view to improving the present practice, which has not kept pace with improvements in other parts of the permanent way. It seems to me that good reasons for this suggestion are given in the report, but the Committee invite the fullest discussion, and would be glad to hear all the reasons that can be urged against the use of such long ties or in favour of the present practice.

I have had personal and favourable experience with the use of long ties over bogs and places where the track crept badly, and have recently been advised by an engineer, who worked on the London & North Western Railway in England, that 10′ 6″ ties were used as

standard on the main lines of that road. As this is one of the best lines in England, and ties are much more expensive there than here, this would appear to be a strong point in favour of them. At all events, it is not logical that we should continue using the same dimensions for ties that were used fifty years ago, when the weights of rolling stock have been increased several hundred per cent.

I accept the responsibility of suggesting these long ties to the Committee, and some members thereof evinced considerable interest in the matter. We cannot expect that the railways will immediately begin the general use of 10′ 6″ ties, but it might be to their interest to try them on new lines under heavy traffic, and the chances are they would prove eminently satisfactory.

I move the adoption of the report.

Mr. Uniacke — I second it.

Mr. Mountain — I think the suggestion that Mr. MacPherson, as Chairman of the Tie Committee, brought up is very proper. The only question is how far we are to go in this matter without a full discussion of it. If this is adopted, does it mean that we give it out as a recommendation that 10′ 6″ ties should be used? I presume that is probably what it means if this is adopted. I thought, perhaps, there would be some discussion on it.

The President — I do not think it has been our usual practice to consider the adoption of a report as indicating the concurrence of the Council. I think the practice is that the report expresses the ideas of the people who wrote it, and not the opinion of the Society.

Mr. Mountain — What is the difference?

Mr. MacPherson — In reply to the remarks of the Chairman, I would say that the Committee suggest the testing of 10′ 6″ ties; that is all.

The President — We do not want the Society to adopt anything definitely that has not been fully tried out, but there can be no harm in adopting the report asking for tests to be made.

Motion carried.

The next report is that on Transportation Routes. This is a report of progress.

Report adopted.

The next is a report of the Committee on Rails, Fastenings, and Tie-plates.

Mr. MacPherson — I move the reception of the report.

Mr. Mountain — I second it.

The President — I understand that Mr. Kelley expected to be present. He has not yet arrived, and it might be well to lay this report over till a future time in the hope that he may reach here. It is understood that this report stands over in the meantime.

The next report is that of the Committee on Road-bed and Ballasting.

Report adopted.

The next is the report of the Committee on the Establishment of Testing Laboratories.

Dr. Galbraith

I beg to move the adoption of the report, and to direct the attention of the meeting to the foot of page 13, the last letter in the series The Committee was directed by the Council to ask the Government for an appropriation, and instead of doing that, the Chairman of the Committee, Mr. Keefer, met Dr. Pugsley and his Deputy, and discussed how best to make progress, and you have the result here.

Dr. Galbraith then read the report.

Motion carried.

The President

The next report is that on Conservation.

Mr. White

The report is fairly complete. In its inception the Committee was confronted by one great difficulty, and that was to decide what the members of the Society could do to assist the Commission of Conservation in the work it now has in hand. A commission dealing with the natural resources of the country touches upon every phase of human activity, and to cover every requirement would demand a very much larger staff than it is possible for the Commission to employ. The first thing to do was to get all readily available information, and then proceed as far as possible to fill the gaps. We have now in the press a report on the Water Powers of Canada, which is fairly complete, so far as our present knowledge goes, for Ontario and Quebec. I regret to say, however, that it is sadly deficient in regard to water powers in British Columbia, the three Prairie Provinces, and New Brunswick. We have managed to accumulate a fair amount of knowledge in respect to Nova Scotia. In addition to the information contained in the report, I prepared a circular, of which a copy was sent to each member of the Society residing in Canada. I trust that all the members of the Society, particularly those in the Prairie Provinces and New Brunswick, will give us as full information as possible. As soon as returns are received, they will be compiled and published, and I shall have much pleasure in sending it and other information to every member of the Society. As soon as we have disposed of this question of Water Power, we will endeavor also to get the assistance of the members of the Society as to other resources. I assure you that the Commission is doing its best, so far as it is able, to place before the people of this country its ideas in regard to the best use of all our natural resources.

Mr. Lamb

I move the adoption of the report.

Mr. MacPherson

I second the motion.

Motion carried.

The President

The next is the report on Cement Specifications.

Mr. Mountain

I move its adoption. In doing so, I beg to call attention to the fact that we have been adopting all the reports of the Committees without continuing the Committees.

The President — A general resolution passed later will cover that point.

There is a report on the Improvement of the Government Engineering Service.

Mr. Lamb — As a member of both Committees mentioned in this report, it might be in order for me to say that fair progress has been made. As most of the members are aware, the Premier accorded us a meeting on Friday last. The delegation was a large and representative one, and was accompanied by representatives from this Society. The result of the meeting was that Dr. Pugsley, Minister of Public Works, was deputed by the Premier to fully investigate the matter. Dr. Pugsley has invited the Committee to go into the question with him, and to furnish all the data at its disposal, so that he may be able to report to the Government the steps that he would advise. We hope that the Minister of Public Works will take this matter up within the next few days, and a committee of Government engineers are ready to work with him on the matter in Ottawa.

The President — It must be very gratifying to the members to hear the favourable statements which Mr. Lamb has just made on this subject.

Motion carried.

Meeting adjourned at 12.30 p.m.

Afternoon Session, January 24th, 1911.

The meeting was called to order, the President occupying the chair.

The President — Gentlemen, the next report on the list is Usefulness of the Society and Educational Requirements. This is a short report, and the Secretary tells me it is a very important one, so perhaps it will be well to have it read.

The Secretary — The importance of it consists in the recommendations.

The Secretary read the report.

The President — Will someone please move that this report be adopted.

Mr. Muckleston — Mr. W. H. Muckleston.—I move the reception of the report, Mr. Chairman. Might I ask the Secretary to state how the Council has power to prescribe and conduct the necessary examinations.

The Secretary — The By-Law requires that certificates of education should be presented, but very often men come up for admission to the Society as Students or as Associate Members, and they cannot produce such certificates. It may be obvious that their educational attainments are in every respect admirable, but if there are no certificates to be presented the Council has no means of ascertaining whether they are qualified educationally or not. I do not think that anything in the By-Laws prevents them from holding an examination, but there is no positive instruction requiring them to do so.

Mr. Mountain — Of course, in addition the Branches assist in that way, because,

as you know, the Council often asks the Branches to advise in regard to the classification of an applicant from their districts.

Col. Anderson

It appears to me that the time has come when the Society not only can, but should take a much firmer stand with regard to the qualifications and education of men in any grade of the Society below that of member. Personally, I have heard a good many criticisms with regard to the qualifications of some of the men who have been admitted, but I do not think, under our present regulations, that the Council, or any portion of the Society, has the necessary information at hand that will enable them to grade members without making mistakes. For instance, one man, in making out a list of his qualifications, will be very modest and will only mention the more important of his works and points that are really worthy of attention, while another man will put in every little job he has ever been on, putting in his qualifications in such a way that one would think he had done a great deal of work, when, if the record and the different statements were analyzed, it would be found his work was not of such a nature as would, under our Charter, qualify him for admission.

Lately, some of us have been in communication with the heads of departments with regard to bettering the conditions attached to engineering in the Government service, and we urged that membership in the Canadian Society of Civil Engineers should be taken as a certificate of qualification. Our attention was drawn to the fact that there were seemingly many men who were admitted to the Society whose qualifications were doubtful. The remedy is, that the Canadian Society of Civil Engineers shall stiffen their requirements with regard to these men; and, personally, I should welcome any change in the By-Laws which would enable the Council to apply more severe tests to candidates for admission so as to ensure getting the best men in the field. We can afford, as well as any university in Canada, to pluck men if they are not up to our standards.

The President

Mr. Duggan, I think that is a matter in which you are interested. Kindly give us your ideas.

Mr. Duggan

Unfortunately, for some years past, location and circumstances have prevented me from being closely in touch with the affairs of the Society, and I am afraid I am not sufficiently familiar with the present practice of the Council to discuss this subject intelligently

When I was on the Council the question of qualification for membership was constantly under consideration, and the scheme of examinations for admission had been outlined, if it had not been actually put into practice. The whole tendency at the time was to make the investigation of qualifications more searching, and I am surprised to hear that men are admitted who are not properly qualified. I entirely agree with Col. Anderson that this should not be the

Mr. Duggan case, but that corporate membership in the Society should stamp a man as being qualified to practice as an engineer and carry out such works as he may have had experience in. I do not, however, think we will attain this end by making the admission of students any more difficult, or by holding examinations to admit them, as proposed in the report of the Committee, because, after all, the admission of a student is not admission to membership in the Society, but merely an encouragement to a man who afterwards hopes to qualify for work in the profession, and I do not think the fact that a man has been admitted as a student, or is not a student, should in any way affect the consideration of his qualifications for admission to membership.

Col. Anderson I did not intend to convey the impression that the conditions are more lax than they were. What I meant was, they should be made still more stringent than they have been.

Mr. Duggan I agree with Col. Anderson to this extent, that if the regulations and practices now in force are too lax to assure us that men who are admitted to membership are qualified to practice the profession of engineering, the requirements should be made more severe.

The Secretary I think all who have been on the Council will admit that all applications for admission have been carefully considered. There has been a tentative assumption that a man, having been admitted a Student, is qualified to go forward to Associate Membership so far as his general educational training was concerned; that the subsequent requirement was merely his professional employment, and perhaps we have got into some difficulty in that connection. Our By-Law only requires a general educational training for Students, and does not specify that the same tests be applied for Associate Members. It is assumed that those applying for a higher grade should have the educational qualifications.

Mr. MacPherson Take the case of a man who might have very great practical experience, and who, for good reasons, might not yet have joined our Society. He might even have a college education, but have been out of college so long that his higher mathematics had become rusty. If such a man had to undergo a purely theoretical examination, it is probable that a junior college man, with very little practical experience, would far surpass him in such an examination. It seems to me that we must have examinations cover both theoretical and practical work, in order to give all desirable men as nearly as possible equal chances of passing.

The Secretary As I am the only one who was present at the meeting of the Committee, I might say that this question came up, and the solution suggested was that a man should be called upon to write a report upon one or two subjects, giving an account of an engineering work,

one subject being prescribed, and another one selected by himself, the requirement being that he should be able to describe his work and to express himself clearly.

In reply to the Secretary's remarks, a man might have the verbal facility to describe a work very well, without having the ability to carry it out in practice. Mr. MacPherson

Gentlemen, it seems that this move is in the right direction; there does not seem to be any very definite conclusion arrived at. I approve of Colonel Anderson's suggestion that this be referred to the Council, with the request to prepare a by-law to be submitted at the next Annual Meeting, or perhaps to submit a system under which members would be admitted to the Society. The Institution of Civil Engineers have examinations for all classes up to that of Member, including Associate Members. The President

Does that mean that a man who had never belonged could join as a member without being examined? Mr. MacPherson

Yes. Mr. Schwitzer was admitted as a Member a year ago. The Secretary

Yes, and Mr. Kelley was admitted as a Member. Mr. Mountain

It must be recognized that a man eminent in his profession must be admitted without passing lower grade examinations. I think Colonel Anderson's suggestion would be a very good one for this report. The President

It seems to me that the admission of Students is of no practical importance to the Society, as the Student membership does not carry with it any endorsement of the Society that a man is qualified to practice, but merely the idea that he is studying for his profession. To hold examinations for Students would undoubtedly entail some expense, give the Council additional trouble, and I do not think the benefit would outweigh these objections. If it is found that it is not practicable to determine whether men seeking membership as Juniors or Associates are fully qualified without examination, then I am quite in accord with you, but I think it would be rather a mistake to hold examinations for Students, and thus give them some measure of standing in the Society which they do not now hold. Mr. Duggan

It is not desirable to admit candidates in the junior grades who cannot qualify as Students. The Secretary

You cannot tell what they will be later on. Mr. Duggan

It seems to me that Mr. Duggan's suggestion is a good one. When Students desire to transfer to the grade of Junior, but fail to pass the prescribed examination, they will be eliminated. It would be a useless expense and trouble to examine Students before admitting them as such. Mr. MacPherson

All engineers' societies have found this subject a very difficult one. There is no use in admitting a Student who has not some Mr. J. Kennedy

Mr. J. Kennedy knowledge to begin with, and who has not shown some aptitude for the work of engineering. He should show, to begin with, by examination or otherwise, some education, for the important point at this stage is fitness for a technical education, to prove his capabilities for becoming a good engineer. He might be fitted to become a good poet or a successful merchant, but not a good engineer; the scholastic and technical education are the mere tools with which he must work. His position as regards large works and enterprises in later life can fairly be taken as proofs of his natural and acquired abilities, and how far he has been able to profit by education and experience. We have therefore mainly to ascertain what kind of mind a Student has, and the examination should be chiefly directed to that end.

Col. Anderson I would move that this report be received and adopted, and referred to the Council for the purpose of drafting regulations for the examination of candidates for admission to the grades of Junior and Associate Member, such regulations to be submitted to vote before the next Annual Meeting. In that way I leave out the consideration as to the qualification of Students, because I agree with Mr. Duggan that if a Student cannot advance to Junior Member without proper examination, there is not very much harm done in having him in as a Student, and I leave out the question of Member, because I think we all agree that when a man has attained eminent standing in the profession he is entitled to be a full Member.

Mr. Muckleston The methods of the United States Civil Service Department might be of use in connection with this discussion. Their examinations are practically divided into three parts. They ask a man to write a technical paper, to make a report, and submit a sworn statement as to his qualifications and experience. The marks are so arranged that, although he does not pass on the technical paper, he may qualify on his report and statement of experience. Some such scheme as that might overcome the difficulty referred to by Col. Anderson.

Col. Anderson Personally, I do not care how it is done; what I am aiming at is to see such regulations put in force by the Council of the Society as shall form a guarantee to the public, as coming from the Society, that a man who has our commission as an engineer has the requisite qualifications. Membership in the Society should mean something, and it should be utterly impossible for a man to fake up a record and get a standing on it. There is just the suspicion that it has been done in the past, and it is for us to see that it cannot be repeated.

Mr. J. Kennedy What is the objection to having the Council formulate something now, without waiting for the next Annual Meeting?

Mr. Thomson Mr. W. Chase Thomson.—Where they are unable to present a certificate, why should not the Council then prepare an examination.

That could very easily be done. It would be much more satisfactory than admitting Students without any recommendation.

Mr. J. M. Wilson.—I would like to ask, Mr. President, if we have any regulations prohibiting engineering salesmen becoming members of the Society. Many men who have sufficient technical education to pass any examination enter the employ of some firm as salesman on leaving college, and have very little real knowledge of civil engineering. I would like to know if it is the feeling of the meeting that such men should be discriminated against? Mr. Wilson

How could they go forward? They have no experience for any higher grade. Mr. John Kennedy

I believe we have men of that type as Associate Members. Mr. Wilson

Once a man is a Member, an Associate Member, or a Junior of this Society, there is nothing binding upon him as to what occupation he shall follow. On the other hand, if a man is simply engaged as an engineer's salesman, without the qualifications which would entitle him to membership, I do not see that he could be admitted to the Society. I take it, what Mr. Wilson refers to is a system which is a good deal in vogue in the United States, for instance, in the American Waterworks Association, where they have a membership outside of the engineering membership. Of course, we have nothing corresponding with that in this Society. We have Associates, but that does not qualify in any way for membership. We are getting a litttle away from the question. I will read Col. Anderson's motion: "That the report be received and adopted, and referred to the Council for the purpose of drafting regulations for the examination of candidates for admission to the grades of Junior and Associate Member, such regulations to be submitted to vote before the next Annual Meeting." Mr. Thomson, I think, made some remarks which might indicate that he wanted that motion slightly amended. The President

Yes, with regard to Students. I do not think it would be very much trouble to make that slight alteration that this would not apply to Students who were able to produce the certificates. Mr. Thomson

That is covered by the report itself, which is now under consideration, namely, that in case of any doubt as to the qualifications of the applicant for admission to any grade below membership, the Council be instructed to prescribe and conduct the necessary examinations. The President

That covers it. I withdraw my motion. I would like an expression of this meeting as to the matter of stricter regulations for the admission to the junior grades in the Society for the guidance of the Council. I think, Mr President, you can tell the Council that this meeting is in favour of some amendment to the regulations. Col. Anderson

Do I understand that Col. Anderson moves the adoption of this report? The President

Col. Anderson — **Yes.**

Seconded by Mr. MacPherson.

Carried.

The President — The next item is the report of the Committee on Standard Specifications for Cast-iron Waterpipes and Special Castings. I do not think that should have properly appeared on the order paper, because the instructions of the last meeting to the Council to prepare such specifications have been carried out, and standard specifications have been issued; it is not necessary, therefore, to take any action on that item.

The next report is that on Sewage Disposal.

Mr. John Kennedy — I regret that I am the only member of that Committee, so far as I know, who is present. Unfortunately, the Chairman, Mr. Lea, who took an active interest in the matter, was laid aside with that fashionable disease appendicitis, and has not recovered sufficiently to be here. The report was issued here lately, and probably all have not had time to study it, but the essence, as you will see by glancing over it, is to give a general history and study of the art of purification, and then deal with it as to the pollution of streams in two respects—first, as to visible pollution, and second, as to sanitary pollution. The Committee came to the conclusion, and I think it is in accord with what has been the practical conclusion of all who have really gone into the matter, that it is comparatively easy, and at least entirely reasonable, that municipalities, communities, and large manufacturing establishments should be obliged to clarify their effluents so that they may not be visibly polluted or otherwise offensive. But, on the other hand, it is impracticable to make or maintain streams in such a condition as to be wholesome from a sanitary viewpoint. For instance, one city, situated below another, no matter how good the intentions of the upper city might be, could not safely depend upon the means of purification which the upper city might take to make the water good enough for domestic or drinking purposes for the lower city; so that our conclusion was that there should be such legislation as would prevent communities from discharging effluents into streams which would make them offensive or visibly worse than before, and that, on the other hand, all cities should see to the chemical and bacterial purification of their water supply.

It is hoped that the discussion here will have some effect on the legislation of the country, and the recommendations made have had that end in view. There are also fairly complete statements of what has been done in the way of legislation elsewhere, and of what the condition is throughout the country. The towns that have not replied are largely those that are doing nothing in the matter of water or sewage purification, and do not want their condition to be disclosed.

Mr. John Kennedy

The report is rather voluminous, and for the benefit of those who may not have time to study it, a summary has been presented, and it might be well for the Society to consider if it would be desirable to bring our conclusions to the notice of Parliament. The public sentiment is largely in favour of something being done, and the time has undoubtedly arrived for taking action. We have so much pure water in Canada that, until recently, it has not been necessary to do anything, but that condition of affairs may be said to have passed.

Mr. Rust

I do not think it wise to adopt this report at present. As Mr. Kennedy has just said, we would possibly tie ourselves up to something we are not sure of.

In the question of sewage disposal, a general method cannot of course be applied to all cities and towns. Each has to be treated separately. In the case of our cities situated on the Great Lakes and on large rivers, the best purification there is the water itself. It is much cheaper and probably a great deal more efficient than any purification works. There is another matter, too, which I think the Society should take up, and that is the question of the formation of the various Provincial Boards of Health. They are, in nearly every case, composed entirely, or almost entirely, of medical men, and engineers are not represented. We frequently have to go before them with plans of which they understand nothing. They, looking, of course, to the health of the public, are apt to insist upon conditions which are so arbitrary as to make it impossible for a number of small municipalities to carry them out. If the Society can do so, I think we should bring to the attention of the various Provinces the advisability of having a representative of our Society upon these Boards. Of course, they all should engage a sanitary engineer to advise them and report on all plans that are submitted to them, and, therefore, I do not think this report should be adopted at the present time.

Mr. Murray

Mr. T. Aird Murray.—I am somewhat disappointed with the principle which has been adopted in the report. For the last two years I have been Consulting Engineer for the Province of Saskatchewan, which Province has a Bureau of Health, the affairs of which are administered by a Commissioner who is a medical man, and I have acted with him in forming a policy in connection with sewage disposal, which has been adopted by the Government and put into effect in all the cities in Saskatchewan. The principle adopted in the report, so far as I can gather from it, is this, that it is only practicable to remove from sewage matter of a character which appeals to the senses, such as that formed by putrescence or decomposition of the organic matter in the sewage. In fact, the report appears to me to be based chiefly on the conclusions of the report of the Royal Commission on Sewage Disposal, Great Britain, pub-

Mr. Murray

lished at the close of 1909. So far as Great Britain is concerned, this report may be satisfactory, because, with the exception of the London water supply, there is practically no water supply in England which is drawn from streams polluted with sewage. The water supplies are chiefly drawn from lakes or the upper reaches of rivers, which are entirely free from sewage pollution.

The policy of removal of putrescence is practically accepted in the United States, because of the fact that the rivers have become so polluted that it is almost impossible to obtain pathogenic purity by the adoption of sewage disposal. In Canada we have not arrived at that stage; furthermore, we have rivers and lakes practically pure. The waters of Lake Ontario and other lakes rank among the purest in the world. There is water within a short distance from Toronto which contains only 8 to 10 bacteria per cubic centimeter. In the North and South Saskatchewan Rivers at certain seasons of the year the water is pathogenically sterile, whereas in the spring, when the ice melts, the water is contaminated, owing to the fact that sewage is carried down in the ice. For example, Saskatoon and Prince Albert are seldom free from typhoid at this period of the year.

What is it in connection with sewage disposal that will appeal most to these people? Surely it must be the promise that sewage disposal in some way or other will tend to eliminate this chance of typhoid infection.

At the present time the cities of Saskatchewan and many of the smaller towns have voted large sums of money for the installation of sewage disposal plants and in every case the main feature of these installations is the final treatment of the effluent by hypochlorite sterilization. I do not think myself that it would have been possible to obtain majority votes for the issue of these debentures if all that we could have promised the people was the removal of an æsthetic nuisance and no elimination of disease infection. The point made by this report that the onus of purifying a domestic water supply should be entirely met by the cities and towns using that water, may apply to cities wealthy enough to instal elaborate and efficient water purification plants, accompanied by a laboratory and an efficient bacteriologist or chemist. But how about the smaller communities and the individual farmer? Is it practical to ask the latter to instal methods of water purification, or is it not better to put into effect methods of preventing disease contamination of waters, on the principle that prevention is better than cure?

A great number of typhoid epidemics in the West have been traced in their origin to milk supplies, and these supplies come from small rural communities or isolated farms where city-polluted water has been used for rinsing out the milk cans. We had only last year

at Moose Jaw a case in point, where a farmer, located nine miles below Moose Jaw, delivered milk in Moose Jaw in cans rinsed by creek water. The result was a typhoid epidemic which was limited practically to those people who used this milk; thus the city of Moose Jaw, because it did not disinfect its sewage, handed out typhoid germs to Moose Jaw Creek, which were again handed back to Moose Jaw mixed with milk. This point of the necessity of obtaining a water free from typhoid germs which are the product of intestinal discharges is the main factor in inducing communities in the West to provide efficient methods of sewage disposal. Mr. Murray

That the Committee's report should state that it is impracticable to instal sewage disposal systems which will bring about this desired result is, I think, somewhat unfortunate in view of the experimental work and practical findings of Bernard Phelps, of this continent, and of Professor Dunbar, of Hamburg, which have proved to the sanitary world that it is possible and eminently practicable to produce sterilized sewage effluent at very small cost.

I think Mr. Murray has, in some respects, misunderstood me. We know perfectly well that, as a chemical and bacteriological problem, it is entirely possible to chemically purify sewage, but we know, as practical men, it is unwise for one community to trust to another in this respect. Mr Murray has said himself that, although a municipality may purify its effluent and make it entirely chemically and bacteriologically pure, there may be someone washing milk cans in a dairy yard, polluting the stream and making it poisonous. Mr. Hazen has been quoted. Within three or four days there has been published in the newspapers Mr. Hazen's own reports, and he says that, dealing with the question of water purification in Ottawa, the establishment of a purification works at Aylmer would be of no practical use. He says they may purify their sewage to-day and some man pollute it to-morrow. In dealing with Ottawa, he assumes that, no matter what Aylmer does, Ottawa should purify its own water. We have arrived at the point where engineers and others differ. Should we try to keep all our streams pure? Should any effluent that is put in be entirely chemically and bacteriologically pure? In dealing with all discharges from cities and from farmyards, dairies, and everything, in a country which is being more thickly settled all the time, should each city take care of the small percentage of water which is used for the water supply of that city? If the water is reasonably pure the intestinal life of bacteria will pretty generally die out from one place to another and from one river to another, but as a problem it is enormously cheaper and safer for each city to take care of its own water supply than it is to depend on all the accumulated population along any stream. That is the practical problem. We all know that, scientifically, it is easy to Mr. John Kennedy

purify sewage. You can take abominable stuff and purify it, but it is not nice, and it is not safe. That is just the point where engineers differ. It is a question of practicability and economy. The report takes the view that it is best to keep the waters reasonably pure, and that each city should further purify its own. It may be best to merely receive the report and let the discussion continue, for it is an unsettled problem, and perhaps we have not quite arrived at a point where we can act.

Mr. Jas. White

In October last the Committee on Public Health of the Commission of Conservation called a Public Health Conference at Ottawa. It was convened at the request of the Senate Committee on Public Health, and, as a result of their report, last session, the Public Health Officers of each Province and of the various departments of the Dominion Government were invited to meet at Ottawa.

It may be of interest to Mr Murray to know that a motion was unanimously passed recommending the various Provinces in the Dominion to adopt the policy for the prevention of pollution of streams, recently inaugurated in the Province of Saskatchewan. Of course, as Mr. Kennedy has pointed out, the question as to whether a city should or should not treat its sewage is a complicated one. Last session a sweeping bill, providing that every municipality should treat its sewage, was introduced. Every municipality cannot be expected to treat its own sewage, but I think that every municipality, town, and city that can afford it should do so. Aylmer and Ottawa are emptying millions of gallons of sewage into the Ottawa River. That is, to my mind, a public scandal. Then there is Guelph, which put in a septic tank system some years ago. Upon examination this was found to have become inoperative owing to its having become permanently choked with a jelly-like mass, thus giving no efficiency to the treatment, and the sewage of the city was emptying into the creek in a raw state, creating a nuisance for some miles along its course. A remodelled system was put in, and it was subsequently discovered that this new plant was not being properly worked, the sewage again flowing into the stream at times absolutely untreated and unaffected.

Mr. Murray

In connection with the Saskatchewan River, we have had several tests, and the only time we have had any intestinal bacteria is after the flowing of the ice, and the only town on the North Saskatchewan River which discharges any quantity of sewage is Edmonton, three or four hundred miles above Prince Albert. We talk about rivers purifying themselves in this country, but in many of these towns the sewage is poured on solid ice, and when the ice melts we get pieces of paper coming from Edmonton down to Prince Albert, and it is generally about that time that we get an outbreak of typhoid. While water may chemically purify itself in running

streams, unfortunately it does not do so pathogenically. With reference to the Niagara River, Dr. Amyot, the Ontario Provincial Bacteriologist, has made several experiments and examinations of the river, which prove that the organic matter discharged with the sewage of Buffalo is practically oxydized by the fall and rapids, and, in fact, at Niagara-on-the-Lake the Niagara River is chemically pure. On the other hand, the number of bacteria in the water, both intestinal and otherwise, is practically the same at Niagara-on-the-Lake as it is above the fall, and we, unfortunately, know that in connection with the military camps held at Niagara-on-theLake we have outbreaks of intestinal inflammation among the soldiers who drink this water. Curious, however, to relate, as soon as we get into the quiet water of the lake, about nine or ten miles from the mouth of the river, we obtain a water which is bacterially pure. This simply means that bacteria are carried along in running streams, but in quiescent water they fall to the bottom by gravitation or sedimentation. The question then of the ultimate purification of water in rivers is not worthy of any discussion, and forms no factor in the case. Mr. Murray

I would move that the report be received but not adopted. Mr. Rust

I second that. Mr. J. Kennedy

Gentlemen, it has been moved and seconded that this report be received. I think I would like to say something myself on that question, if I may be allowed a few moments. There are two schools of prevention of diseases from contaminated water. One of them, I think, fully represented by Mr. Aird Murray, thinks that the difficulty may be overcome by purifying all the sewage; another, of whom, I think, Messrs. Hazen and Whipple may be taken as exponents, approves that the water supplies of the cities should be purified. I do not suppose that in most cases either of those systems would fully meet the requirement. It is a matter to which you cannot apply any general remedy. That is, you cannot state a remedy that is applicable to all cases. Take an instance of our own case—the city of Winnipeg. We had typhoid epidemics here every autumn of what was at the time called Red River fever, before we had any sewers at all emptying into the rivers. The towns in the United States to the south of us—such as Moorhead, Fargo, Grand Forks, and Crookston—sent down practically unpurified sewage into the Red River; we got that here. What would be the practical advantage of purifying our sewage and dumping it into a polluted river? The President

The points made by Mr. Murray as to the contamination below Moose Jaw through the farmer's milk supply I have no doubt is a thing that happens very often. On the other hand, even if Moose Jaw had purified its sewage, there are cases of typhoid occurring

constantly below over which there is no control whatever. So, as Mr. Kennedy says, it would not be safe to rely simply on the purification of sewage by towns.

Mr. Murray — Were not all the cases on Moose Jaw Creek probably caused by using the Moose Jaw water? Typhoid germs only come from the human intestines, and come with sewage.

The President — If the germs could be removed it is possible that a good many cases would be eliminated, but would this not give a false confidence to those people living below the town? Take the case of Yellow Grass. Is there not a stream there?

A Member — And was there any indication of where those germs came from; is there any town above?

The President — In Southern Manitoba, in towns where there are no streams whatever, there are many serious epidemics of typhoid. Each case should be taken on its merits, and then everything that medical men and engineers can do should be done. If the matter is left entirely in the hands of the medical men, they will only see one particular phase of the problem. They do not combine with that, knowledge of other essential requirements. In passing legislation, we should be very careful that we do not cause more harm than good by putting some of the towns to unnecessary expense. Anything that is done should only be undertaken after careful professional advice. I think the report and the information the Committee has collected is most valuable. It should not perhaps be adopted as it stands, but the Committee should be continued, and the matter further investigated and brought up at the next Annual Meeting.

Mr. Wilson — During the last six or eight weeks the medical health officer of Moose Jaw examined samples of milk brought into the city and found that 90% coming from points on the river below Moose Jaw were contamined with intestinal bacteria, and in the design for works intended to be put in this summer, provision is being made for treating the effluent as a measure of self-defence on account of the fact that the milk is brought by the dairymen from below Moose Jaw.

Mr. Rust — We all recognize the work Dr. Hodgetts and Dr. Amyot have done, but what I was suggesting was that the medical men should have the assistance of engineers in reporting upon plans.

Mr. Muckleston — In connection with the C.P.R. irrigation work at Calgary, cases have come to my notice where irrigation canals running through 400 square miles of country have been the source of typhoid among the farmers and ranchers along these irrigation ditches, where the water has been used for watering the stock and in many cases for domestic purposes.

Col. Anderson — Following up your recommendation that the Committee should be continued, I have prepared a motion that the standing and special committees of the Society be re-appointed for the coming year, with

power to replace members unwilling or unable to serve by other members, and with power to add to their numbers. That is just a blanket resolution to cover these committees.

We will put the motion to receive this report first. The President

(Motion to receive report carried.)

Col. Anderson's motion is now in order.

(Col. Anderson's motion carried.)

There is only one remaining report of committees to be considered, and that is a report of the Committee on the International Electro-Technical Commission.

Prof. L. A. Herdt.—The report of this Committee might have been a little more detailed, and I may possibly in a few words give you some idea of the work carried out by the Commission. Prof. Herdt

Local committees have been formed in Denmark, France, Great Britain, Germany, Hungary, Mexico, Spain, Sweden, United States, and Canada.

The first work taken up is that of nomenclature, or a standardization of the symbols used for electrical terms. The question of standards for electrical units is also engaging the attention of the Commission, as also the adoption of the C.G.S. system in all countries. The other work to be carried out is the standardization of electrical machinery.

The work of this Commission is carried on by correspondence, so it must be necessarily slow. The work is going on very satisfactorily, and if the Committee is allowed to continue its labours, it hopes to report further progress at the next Annual Meeting of the Society. The Commission is to hold its Annual Meeting at Turin, Italy, during the year, and the Canadian Committee will try to send a delegate to it.

Any further discussion on this report? The President

I move the report be adopted and the Committee continued. Mr. Mountain

Mr. William Kennedy, Jr.—I second that. (Carried). Mr. W. Kennedy, Jr.

That closes the order paper for to-day. I am requested to say that this evening the ladies of the Women's Canadian Club of Winnipeg are giving a reception and musicale for the members of this Society and the ladies accompanying them, in the drawing-room of this hotel. The reception begins, I believe, at half past eight. The President

To-morrow morning, at a quarter to nine, the train will leave for Point du Bois. There is also an excursion to the Grand Trunk Pacific Shops some time during the morning, and also to the dam at St. Andrew's Rapids at a later time during the day. Members can procure tickets for all of these excursions at the office.

Luncheon will be served on the special train to Point du Bois, the city of Winnipeg having provided a dining car for that purpose.

Mr. T. C. Irving, Jr.—May I ask if the Committee on Standardization of Cast-iron Waterpipe is still in force. Mr. Irving

The President It was stated that that Committee had carried out their duties and the report was issued, and I do not see that there is any reason for continuing this Committee.

Mr. Irving There was a motion brought in that all Committees be continued.

The President This one would be excepted.

A motion to adjourn at 5.35 was carried.

In the evening, the Women's Canadian Club of Winnipeg entertained the members and ladies accompanying them in the drawing room of the Royal Alexandra Hotel.

WEDNESDAY, JANUARY 25TH.

A special train, provided by the Canadian Pacific Railway, conveyed a party of members, citizens of Winnipeg, and ladies, to Point du Bois, to visit the city power works at that point, and in the afternoon the St. Andrew's Dam and the shops of the Grand Trunk Pacific Railway were visited.

At 8 p.m. the annual dinner was held in the Royal Alexandra Hotel, and was attended by about 200 members and guests of the Society.

THIRD SESSION, THURSDAY MORNING, JANUARY 26TH, 1911.

Colonel H. N. Ruttan, President, in the chair.

Gentlemen, the first order of business is consideration of the resolution of the Annual Meeting of 1909, relating to the printing and forwarding to Branches of the reports of the various committees before they are submitted to the Council. I would ask Professor McLeod to read that resolution, and to explain the impracticability of carrying it out. The trouble is that it is hard to get those reports in and get them printed in time for the Annual Meeting, and an attempt to get them two months before that seems to be quite out of the question. The President

The resolution in question is as follows: "That as Branches of the Society are rapidly forming in various parts of Canada, all reports of committees appointed at the Annual Meeting be printed and forwarded to the Branches one month before a special meeting of Council, and that the Chairman of each Branch, or other approved delegate, be invited to attend that meeting and present a concise statement, voicing the opinions of the members of his branch on all such reports, and that the reports be considered at said meeting of Council; and further, the Council is recommended to make reports, recommendations, and draft motions to be presented at the Annual Meeting of the Society to facilitate the discussions thereat." There would be no difficulty whatever in so far as sending the papers out to branches is concerned, if only committees could be induced to report in time. It would really be necessary to have the reports in hand for the November Council meeting, but that has not been found possible. The practicability of the branches sending representatives to Montreal to discuss the reports seems doubtful. The Secretary

What do you wish us to do about it? The resolution appears to be an excellent one; it has no penalty attached to it. In the committee that I happen to be on—that on Stream Pollution—I do not think the committee was lax at all. It takes a long time to get the information in certain cases. Mr. John Kennedy

I understand the objection is that submitting the reports to the Branches would entail unnecessary delay, and possibly the margin of time allowed would not permit them being printed before the Annual Meeting. Would it not be better that the reports be sent to the Branches, and that they should be asked to make their representations at the earliest possible date, the Council simply waiting a reasonable time for the reports? Mr. Jas. White

In order to bring the matter before the meeting, I think a motion for reconsideration should be passed. The President

Mr. White — I move a reconsideration of the resolution.

Mr. Lamb — I second that.

(Motion carried.)

The President — While Mr. White is writing out a motion, the next order of business might be gone on with—the announcement *re* Students' prizes.

The Secretary — There were students' papers sent in this year in the General Section and in the Mechanical Section. There are no papers for the Electrical and Mining Sections. The examiners appointed to consider the General Section papers recommend that the award be made to W. H. Martin for a paper on "Water Purification, with special reference to Water Filtration"; and the examiner in the Mechanical Section recommends an award to E. M. Webb for his paper on the "Westinghouse Steam Turbine."

The President — Is there a motion adopting these reports?

Mr. Mountain — I move that these recommendations be adopted.

Mr. Rust — I second that.

(Motion carried.)

Mr. John Kennedy — Before the consideration of the work of committees is concluded, I think the Committee on Pollution of Streams should be continued and a little enlarged by the addition of other members who have had their attention directed particularly to such work. I would like to see yourself, Mr. President, and Mr. Rust, and also Mr. Murray members of the Committee.

The President — The resolution passed gives power to add to the number.

Mr. Rust — I wanted to move that Mr. Kennedy be added to the Committee on Transportation. Mr. Kennedy has taken such an interest in transportation matters, and I think he would be of great assistance to the Society if he was on that Committee.

Mr. Mountain — That Committee has also power to add to its number.

The President — I would suggest that Professor Edwards' name be added to the Committee on Sewage Disposal.

The next matter is a resolution of the Ottawa branch *re* the formation of a Standing Committee on Good Roads Construction. The resolution is as follows: "Resolved that a committee be appointed to consider the question of good roads and street construction and maintenance, and draw up a standard of classification and specification of good roads in Canada."

What shall we do with the resolution?

Mr. Mountain — I think that I was the mover of that in the Ottawa branch. It was during an address by Mr. A. W. Campbell, now Deputy Minister of Railways and Canals. The idea of the Branch, after hearing his address, was that there was a good deal of money squandered by incompetent men, such as pathmasters, etc., all over the country in

making roads, possibly not so much in the west as in the east. In the east this work is done by the townships, and the idea of the Branch was that if we got a standing committee for the construction of good roads and streets, it would be a benefit to the country at large, and might perhaps assist engineers in the judicious expenditure of money at their disposal. In the discussion of the paper, cases were cited in which enormous amounts of money voted by municipalities were wasted for the reason that there was no scientific basis upon which to build roads. I move that the resolution submitted by the Ottawa Branch be adopted by this meeting.

I second that. Mr. White

(Motion carried.)

Only men who are particularly interested in that branch of work should be put on the committee. Mr. Mountain

Would you suggest that the incoming Council appoint such a committee? The President

I think that would be the best idea. Mr. Mountain

Is it the wish of the meeting that Mr. Mountain's suggestion be carried out, and that the matter of appointing a committee be referred to the incoming Council? The President

(Carried.)

I beg to move, seconded by Mr. Lamb, "that as Branches of the Society are forming in all parts of Canada, copies of all reports of committees appointed at the Annual Meeting be sent to the Branches as soon as practicable after receipt, with the request that they be considered at an early date, as great a length of time as possible being allowed the Branches for such consideration." Mr. White

I suppose it would be understood, if the Branches did not report within a certain time, that the Council would go on with the usual routine in connection with those reports? The President

That was my idea. Mr. White

In theory Mr. White's resolution is all right, but, in practice, everybody who has been on the Council for any length of time knows that it will not work. The gentlemen whom we have asked to serve on the different committees no doubt devote a great deal of their time to the work, but are not able to complete the reports at what Mr. White calls an early date. It is usually at the Council meeting immediately before the Annual Meeting that these reports are received. It seems to me impossible to send those reports out to the branches in time to have them discussed before the Annual Meeting. In other words, I think that that work might very well be left to the Council. The Branches must not forget that they send representatives to the Council. There is danger of getting the machinery so complicated that, instead of having one office where this work is all done, there will be duplication. Mr. Mountain

Mr. White — In reply to Mr. Mountain, I would like to say that he has to a certain extent misunderstood the tenour of my resolution. This reference to consideration at an early date did not refer in any way to the date at which the committees should file their reports. It simply provides that if a Branch does not report at an early date it, *ipso facto*, approves of the tenour of that report. Each Branch is of course represented on Council, and I have not the slightest doubt that, if necessary, the Branches would be willing to send a delegate. In most instances the Branches would not do anything more than approve the reports, but it would at least give them the opportunity of filing any objections that they might wish to make.

Mr. Mountain — I thoroughly understood what Mr. White said. My contention is that those reports are not received in time to turn them over to the Branches before they must be prepared for the Annual Meeting.

Mr. Rust — It seems to me the Council is the proper body to deal with these matters. There are Branches in all the large centres, but there are large parts of the Dominion where there are no Branches at all, and I cannot see that we are going to gain anything, and it will probably delay matters considerably. I cannot quite agree with Mr. White that this is necessary.

The Secretary — Would the object of Mr. White's resolution be met by sending a copy of the report to the Branches as soon as it can be printed, and thus give the Branches all the opportunity that time will permit to discuss the report in advance of the Annual Meeting, and send up recommendations to the meeting instead of having these recommendations considered by the Council. The difficulty, as has already been said, is one of time, and some time must necessarily elapse between receiving a report and sending out a copy of it. If you take the case of the report on Stream Pollution, the time required to print that was very considerable, because of the large quantity of tabular matter which it contained. It could not be printed, in the ordinary course, under ten days, and to mimeograph such a report would be a very burdensome affair.

Mr. Duggan — Is not the genesis of this question the fact that the members would like to consider these reports some time before the Annual Meeting, when they are asked to pass upon them? Some of the reports that are sent in are merely expressions of opinion, or perhaps records of some investigations which do not admit of much discussion, and which may safely be left to the Committees, but there are others, such as Standards and Specifications, which will be used as guides in future practice, that are of very great importance, and should have a full discussion before receiving the endorsement of the Society. I think a great many of the members would like to consider these reports in advance of the Annual Meeting, so that they might come up prepared to discuss them and vote upon them intelli-

gently. We have had instances of this at this meeting; some of the reports were only sent in at the last minute, and several members who wished to discuss them have stated they had not had time to give the questions sufficient consideration. I think the wish of the Society would probably be better carried out if these reports were sent out at least a month in advance of the Annual Meeting.

Mr. White

We will all concede that it is often impossible to carry out these things in practice. There is no desire on the part of the Branches to embarrass the work of the Council of the Society. If these reports were received just before the Annual Meeting, or just in time to consider them in Council, obviously it is not possible to carry out the principle of holding them for a considerable length of time until they have been considered by the Branches, and the reports of the Branches have been received. It seems to me that a compromise can be arrived at, so that whenever possible the reports shall be reproduced in some shape or form, printed or mimeographed, and sent to the Branches.

Mr. Duggan

It does not seem to me that that really improves the situation. I beg to move an amendment that the Council should not put forward any reports for adoption at the Annual Meeting unless they have been printed and mailed to members at least, say, one month in advance.

Mr. Rust

I will second that.

Mr. John Kennedy

The resolution proposed is, it seems to me, too hard and fast. There are some reports that could come in very well at the Annual Meeting and there be passed upon. Others again, such as Standard Specifications and the like, should be handed in and distributed preparatory to discussion at the meeting. It seems to me that Mr. White's resolution is very good. If practicable, the reports should be distributed to the members to meet Mr. Duggan's idea, but to tie ourselves so that we cannot discuss anything here that has not come in a month in advance would restrict us too much. What should be done in each case might safely be left to the discretion of the Council.

Col. Anderson

It appears to me that this discussion has been useful in this way, that it shows on the one hand the difficulty that the Council labours under in getting reports as early as they would like; it shows, on the other hand, that the members feel that there should be some opportunity for discussing those reports before the Annual Meeting, so that definite action might be taken at the meeting. I think that the point desired has been already pretty well secured by the very publicity that has been given to the matter by this discussion. The Branches of the Society that have been formed have been doing good work; they are making the interest in the work of the Society more lively than it has been possible by discussion at headquarters only, and I think possibly the whole matter might

be left in the shape of suggestions to Council. It is inevitable that a great deal of the active work of the Society must fall upon the Council, but if more of the work could be distributed throughout the membership, the Society would be benefitted as a whole. If the Council will simply take this discussion as suggesting to them that, so far as possible, they should circulate the several reports in time to have them considered in advance of the Annual Meeting, so that at the time of the meeting the members may be in a position to deal with them definitely, our object will have been attained.

A Member — There is another point, that there are a great many of our members, especially in the far west, who are only able to get to the Annual Meetings occasionally. These reports of the Society which we found on our chairs when we came in to the meeting contain a great many matters of interest to members who have not been able to attend this meeting. The fact of those reports being at the meeting, and adopted at the meeting, precludes any possibility of those members contributing anything to the discussion, and Mr. Duggan's suggestion that those reports be submitted, if possible, a month in advance, would allow those members who cannot attend the meeting an opportunity to present what discussion they desire, and I think, on that score alone, Mr. Duggan's suggestion that the reports be sent out if possible a month in advance is worthy of consideration.

Mr. John Kennedy — An important consideration growing out of this is that we ought to be careful in the selection of our committees, and especially careful in the selection of the chairmen, who should be active, energetic men, not too much absorbed in their own professional duties—men who will push their committees to a conclusion of their work as early as possible. Some of us are too busy, and some of us are too negligent to do so.

The President — I will ask the Secretary to read the amendment.

The Secretary — Amendment moved by Mr. Duggan and seconded by Mr. Rust: "That reports of committees of the Society be printed and mailed to all members of the Society at least four weeks previous to the Annual Meeting, and only reports so printed and mailed shall be considered at the Annual Meeting."

Under the amendment, any reports of Committees that cannot be presented before the December meeting of Council will have to be held over.

A Member — Might I suggest, in order to simplify the handling of the reports, that copies of the committees' reports be sent to the Branches at the same time as they are sent to the Council, which would probably save a week or so in handling through the mail.

The President — I will put the amendment first.

Amendment carried.

There is a matter which Mr. Kennedy wishes to bring up. The President

Mr. Jas. C. Kennedy.—Mr. President and gentlemen, I have no resolution to offer, but I think a matter of some importance should be explained by some of us who have come from what I might call the "storm centre." It is with regard to the City Engineer of Vancouver. A wave of public criticism passed over Vancouver last autumn, and, as all municipal engineers well know, the criticisms of the public on the engineering of a city or a municipality are not generally very fair, not from the reason that the public intends to be unfair as a majority, but because they do not know the facts—they do not know the inner workings of the city engineer's department or what his instructions are. There has been ever since last autumn a great deal of criticism of the City Engineer's work at Vancouver by the public. It became the popular thing to cry down the City Engineer, and of course the candidates for election took up the cry, and were quite prepared to sacrifice the Engineer. Every City Engineer will understand this pretty well, I think. In this case it was carried to such an extent that the Vancouver Branch of the Canadian Society of Civil Engineers saw fit to step in and do what they could towards obtaining fair treatment of the City Engineer. Immediately after the elections, the City Engineer, who had remained silent, and was of course not in a position to reply to every public criticism, sent a letter to the newly-elected Council asking that, in justice to himself and to those who had supported him throughout the past year, an investigating board of engineers be appointed to enquire into the affairs of the City Engineer, and to report to the Council; or, if the city preferred to do so, they were asked to appoint an investigation committee under the Public Utilities Act. The Engineer stated plainly and in a manly way that, in the event of the finding of the committee being adverse to him, the Council could consider the communication that he had sent in as his resignation. The newly-elected Mayor appointed an investigation committee of his own to consider the affairs of the City Engineer's department, and to report, and I believe I am right in stating that that committee was hostile to the City Engineer, and, as far as we could discern, was selected on that ground, with the exception of one man. Within twenty-four hours they brought in a report to the effect that after making a thorough investigation of the affairs, they had decided to recommend to the Board of Works that steps be taken to procure a supervising engineer to take over the engineering of the city. That report was sent to the Board of Works. The Board of Works called a meeting a week ago last Monday evening at 7.30, and within thirty minutes had adopted the recommendation and passed it on to the Council, which sat at 8.30 the same evening. The engineers of Vancouver, the Branch of the Mr. J. C. Kennedy

Canadian Society, or as many as we could muster in the short time, appeared before the Council and asked for a fair investigation of the work of the City Engineer. We pointed out that he had asked for an investigation, and we considered it was only British fair-play that he should get it. There were four members of the City Council who spoke very favourably of the City Engineer, and condemned the unfair treatment that was being meted out to him. Our representations were ignored, and the recommendation of the committee was put through in spite of everything. Now, it has seemed to us that this is a very opportune time to bring this matter before this Society. I do not wish to propose any resolution, as I might perhaps be considered as biased, but if the gentlemen present see fit to endorse what the Branch has done out there, or to assist the City Engineer and protect him against this unfair treatment, I am sure the Branch at Vancouver will be exceedingly glad. I would like Mr. Cartwright to be heard. I may have overlooked some of the details. I hold in my hand a newspaper account of the proceedings that I have just described, and it is a very fair account. It gives a report of the proceedings of the investigating committee, the Board of Works, and the City Engineer. I shall be glad to show it to anyone who may wish to see it.

Mr. Cartwright

MR. C. E. CARTWRIGHT.—Mr. President, I would like to endorse what Mr. Kennedy has said. There is only one other point which occurs to me, and that is, a couple of years ago there was an investigation made into the City Engineer's affairs at Vancouver, and he cleared himself of every charge. The man who was opposed to him —an alderman who was acting on hearsay, and who called for an investigation—found nobody who could back him up. When the investigation was closed, he turned around and has been the Engineer's best friend ever since. I do not think there is anything in the present charges. In fact, there has been nothing definite stated; the only thing stated against him lately is that he carries out his instructions.

Mr. White

I desire to move a resolution as follows: "That the Canadian Society of Civil Engineers has been credibly informed that the City Council of Vancouver has advertised for a supervising engineer, and has refused the present encumbent of the position an investigation, and that the Canadian Society of Civil Engineers censures the action of the City Council of Vancouver as an action opposed to all ideas of British fair-play." I make this motion because I consider it better for someone not connected with Vancouver to propose it. Everyone who has had anything to do with a city council and aldermen knows what their ideas of fair-play are, as a rule, when dealing with engineers.

Prof. Muir Edwards

PROF. MUIR EDWARDS.—I think the word "censure" should be left

out. I should think our position should be one of making a recommendation to our own members. We should be able to convince the City of Vancouver that the Canadian Society of Civil Engineers is a body to be reckoned with, and I think a word might be said to the Branches and perhaps the other societies across the border, and this would perhaps be the only way to deal with the matter.

Mr. White

It seems to me that the resolution should empower the Secretary to call the attention of members to the existing state of affairs.

Mr. Mountain

While I was pleased to hear from Mr. Kennedy of the way the Vancouver Branch defended their brother engineer, I must say I think any resolution passed here might be taken reasonable exception to. These men—the Vancouver Council—may or may not have had some reason for the action they took in not permitting the Engineer to defend himself. I think it means that they did not know very much about their ground, and that their defence should be left to their own conscience.

Mr. John Kennedy

I do not know anything about this matter beyond what has been stated here, and before we are in a position to pass upon it, I think we should know a great deal more than has been stated. It appears the Mayor has appointed a committee, and this committee found the matter so clear that they did not need any investigation to satisfy them. When the committee's report came up in Council only four were against it, and it was adopted. We are not told what the charge was, but the impression received is that there must have been something so obvious that the report went through without the need of further evidence. One can hardly imagine that the Council was entirely unjust, but, on the other hand, the Branch whose members knew all about the matter protested against the Council's action. The question is a delicate and puzzling one, and before we act we should have better information on which to base our findings.

Mr. Lamb

I heartily agree with the views expressed by Mr. Kennedy in the matter, and although there is no doubt that the Society must stand by a brother in good standing if he is badly treated, as this engineer seems to have been, yet we should as a body and as a Society be cognizant of all the facts before placing ourselves in the position of passing a resolution for which we may be afterwards criticised. It appears to me, sir, that the resolution, as moved by Mr. White, may be changed in some way appointing a committee to look into this matter. I think, after the manner in which the Branch in Vancouver has brought the matter to our attention, we cannot do otherwise than take some decided action. This could probably be best done by the appointment of a committee which would look thoroughly into the question and report to the Council, and then we would be on safer ground and formulate a resolution which the result of the investigation warrants.

Mr. Duggan

I entirely agree in the views expressed by Mr. Mountain. I can fully understand the sympathy of the engineers from Vancouver with their associate, who they think has been unjustly dealt with, and I think it was quite proper for them as individuals to use their influence with the City Council on behalf of their associate, and also that the Society should be informed here of all the circumstances of the case. I think, however, the matter should rest there, and that we should take no action whatever with reference to it.

As a Society, we are simply an organization banded together to further our profession by presenting scientific and technical questions for the consideration and discussion of our brother engineers and for personal intercourse. While this is our primary object, we must of course consider public questions that bear on the welfare of the profession as a whole, and we have at times approached the Dominion and Provincial Governments with reference to proper legislation, but I do not think we have ever made representations as a Society to any other governing bodies, certainly not to any City Council. We have, as far as I know, kept strictly out of politics and out of all controversies with the public. I do not think the Society is competent to deal with this question under its Constitution; there is certainly no precedent for doing so, and I think any resolution looking to representation to the Vancouver City Council would be entirely out of place.

Mr. J. C. Kennedy

I would like to ask Mr. Duggan if he thinks that when the Canadian Society of Civil Engineers, or a Branch of it, see plainly an injustice done to one of its members, it should not take any action to defend him and to see that he gets justice done to him. I might have pointed out before that the engineer's reputation is at stake there, and there is no charge against the man—not a solitary charge. The committee that was appointed was composed almost entirely of members who had never been on the Council before, and it was impossible for them to know what the conditions of the department were, or to obtain the facts without a longer consideration. It is true that it was popular for the public to condemn the man, but they did not know what they were doing. The fact of the matter is, the city is going ahead at a phenomenal rate, and it is a very difficult thing for any man to keep pace with it, and leave the streets—that is where the complaint came—leave the streets in such a condition that they would not inconvenience a good many people. It is so easy to find fault with a man for something of that kind, whether he is to blame or not. Not one member of the Board of Works, under whose direction he worked for the last year, had a word of fault to find with him, and the only member of the old Board that was left on the new Council defended him, and I will be disappointed if this Society does not see its way clear to take some action in a case of this kind. Of

course, I do not think they should take action without knowing something of the facts—without satisfying themselves of the facts; but if these are the facts that have been stated, surely we ought to do something for a member who is ill-treated in this way and his character damaged. They are advertising—or at least they are seeking for a man to take his place, and they have not notified him that his services are not satisfactory or that they propose to dispense with them.

Mr. R. C. Smith.—If this Society is to be considered a higher court, how many higher courts would give a decision on the recommendation of a lower court? I think it is a little hasty for this Society to pass a resolution in the way that is proposed. I do think a committee might be appointed, either to discuss the matter with the Branch in Vancouver or possibly confer with the Council before anything definite is done. This is a big Society, and I do not think that in this country or in the United States any higher court would pass a sentence on any person on a suggestion from a lower court or a recommendation from them. Not that this is a court, but it is something similar in that it is the main body of the Canadian Society of Civil Engineers, and has been appealed to by a Branch Society. Mr. Smith

It has been brought to my attention that there is still a sort of mystery as to why the man should be treated in this way. I may state that the Mayor, who has just been re-elected, has been to all appearances at variance with the Engineer. The Mayor was opposed to him from the time he was elected in the first place, and he has been re-elected. He publishes a newspaper, and he makes use of the newspaper to the detriment of the Engineer. Mr. J. C. Kennedy

I do not see that we are required to pass on whether the Council has advertised for another supervising engineer or not, but it seems to me that it is within our province to pass a resolution calling upon any Council employing an engineer to give him a fair hearing. I had this discussion with a gentleman on the train. It seems to me that that is the point he asked for—a body of engineers or a commission under the Public Utilities Act, men whom he knew to be experts, to pass on his case, and he would hand in his resignation if the finding were against him. Prof. Edwards

The delegation set forth that, like the public, it was not in a position to judge whether the Engineer has or has not done right, but that he should have the hearing he had asked for. Mr. J. C. Kennedy

With reference to what was said by Mr. Edwards, the second sentence of my resolution covers the case exactly: "that this Society regrets that the City Council has refused this man an investigation, which is opposed to all ideas of British fair-play." Mr. White

Has there been a seconder to Mr. White's motion? The President

Prof. Edwards — I second it.

The President — I would ask that the Secretary read the motion as put before the meeting.

The Secretary read the motion as follows:

"That the Canadian Society of Civil Engineers has been credibly informed that the City Council of Vancouver has advertised for a supervising engineer, and has refused the present incumbent of the position an investigation, and that the Canadian Society of Civil Engineers regrets the action of the City Council of Vancouver as an action opposed to all ideas of British fair-play."

Mr. Lamb — I wish to move an amendment to this resolution. I propose that a committee of four members be appointed by the President to-day to inquire into this matter and report to the meeting to-morrow morning.

Mr. Muckleston — I will second that motion.

Mr. White — With the permission of my seconder, I withdraw my motion in favour of the amendment.

Mr. John Kennedy — From conversations I have had with those around me, I understand now a little more clearly how this matter stands. There was some trouble between the Mayor and the City Engineer, and the City Engineer put himself in a bad position when he said he would abide by the decision of a committee without knowing what the composition of the committee was to be. The awkward part of it is that he said he would resign if the committee decided against him, and the committee did report against him. Now he wants the whole question gone over again. It is a mixed up thing, and I think this committee would do well if it would confer with the Vancouver members. On the report of the committee we should be able to deal with the matter in a more intelligent manner.

The President — All in favor of the amendment, kindly raise their hand.

I declare the amendment carried.

Prof. Edwards — I am from Edmonton, where we have no branch of the Society, and wish, along with others, to have an opportunity of meeting those members of Council present at this meeting to discuss the formation of a Branch.

Mr. Mountain — As Chairman of the Nominating Committee for 1911, I have heard a good deal of criticism as to the manner in which the Nominating Committee carried out its duties. It was carried out, as you know, under the new by-law, which reads: "The Committee shall nominate Officers and Councillors so as to provide, with the members remaining on the Council, a President; a Vice-President, and six Councillors residing in District No. 1; two other Vice-Presidents and eighteen other Councillors, of which latter three shall be resident in each of the remaining districts, Nos. 2, 3, 4, 5, 6, and

7. . . . ." Now, sir, I interpret that—probably wrongly—to mean that there must be a sufficient number provided. We did so. A good many members of the Nominating Committee sent in their list in the same way without asking any question, and evidently concurred in the same view of that By-Law as the Chairman did. I would like to have the ruling or the feeling of the Society on this because the discussion has been very keen for the last couple of days.

The Secretary — There is a resolution of Council coming up in connection with the matter. Would you like to have that now or later?

Col. Anderson — I might say, for the information of the younger members, that the list sent out by our Nominating Committee, in which we have every confidence, really means that the Nominating Committee elects the new Council. If the exact number who are to be elected are sent out, the chances are ten to one that enough votes will be received for the slate as sent out. The Ottawa Branch this year sent in a separate slate. I understand the result of that has been that half the ballots were invalidated in so far as the Ottawa election was concerned. A good many men not in the Ottawa section sent back their ballots without any names crossed out, and in that case the ballots were invalidated as far as the Ottawa centre was concerned. Under the old regulation the Nominating Committee selected a number of men, say 25, to fill 18 places. That gave the members in outside places an opportunity of selection, and there was a semblance at all events of choice. With this year's ballot there is absolutely no choice at all. We have to take the men that are selected for us by the Nominating Committee. I think that might be overcome if 4 names were sent for each centre instead of 3, or something of that kind.

Dr. Galbraith — We are following the practice of the American Society.

Mr. Mountain — There is no doubt that under this ballot the Nominating Committee do practically nominate the officers for 1911.

Col. Anderson — Elect.

Mr. Mountain — Well, I do not say that, I prefer "nominate." The Nominating Committee is in the best position to know what the composition of the Council should be. They know how close certain prominent men in the Society have come for election to the different offices, and the following year they are usually selected. The outside members cannot know that.

Mr. White — Do you contend that the Nominating Committee should practically elect the Council?

Mr. Mountain — No, I do not say that. I say they are in the best position to judge of the nomination.

Mr. White — I think that is a very fine "wire-drawn" difference indeed. I quite agree with the statement of Colonel Anderson, that there should be

four at least nominated for each district. The great trouble in a Society is the tendency for certain men to get into office, and hold office year after year. Nobody else has a show, and the Society is apt to become permeated with dry-rot. I think the Nominating Committee should nominate four or five, not three—preferably five for each district.

Dr. Galbraith — Although I did not attend the meeting of the Nominating Committee, I sent in my vote by letter, and, having no opportunity to consult with other members of the Nominating Committee, I took the same interpretation as Mr. Mountain of this By-Law. Since coming to Winnipeg, I have been told that there is another interpretation which may be given to it. The words that I referred to are these; "the Committee shall nominate officers and councillors so as to provide that the members . . ." It has been explained to me that this does not necessarily mean that the Nominating Committee shall nominate the exact number of officers, but that they may nominate more; the words, "so as to provide," being wide enough to cover that. It is a pity to change the By-Law, but if we are agreed to that interpretation, it will relieve us of one of the great difficulties, and leave the Nominating Committee fairly free unless you wish to bind them to always appoint more. That will necessitate the amendment of the By-Law.

Mr. Uniacke — I would like to move that the Nominating Committee, in placing nominations on the ballot, should be instructed to name two more than the number possible of election.

Dr. Galbraith — Does that apply to all the officers, from the President down, or simply to Councillors?

Mr. Uniacke — I intended that simply to apply to the Councillors.

Dr. Galbraith — I think that should be in the resolution.

The Secretary read the resolution proposed by the Council, as follows: "The Council recommends that the Annual Meeting instruct the Nominating Committee to name at least twice as many candidates for officers and Members of Council as there are positions to be filled, except for the office of President."

The President — Does that cover the same ground as your motion, Mr. Uniacke?

Mr. Uniacke — In view of the Secretary's explanation, I withdraw my motion.

The Secretary — Hereafter, the Nominating Committee will only have to name one-third of the total number of the officers. In order to carry out the resolution of the Council, it will be necessary to name two members as nominated for each of the districts, the purpose being to elect one, except for district No. 1, where it will be necessary to nominate four members in order to provide for the election of two.

Dr. Galbraith — Is it understood that the several members of the Nominating

Committee shall name members for their own districts only, or the whole number? I do not think it is quite clear.

A Member The whole number, of course.

Mr. White To make the matter clear, do I understand that the recommendation of the Council is such that if it had been carried out this year instead of having three members on the ballot in this particular case there would have been six?

The Secretary Yes, this year. Next year there will be two instead of one.

Mr. John Kennedy This whole matter is a source of continual dissatisfaction. We have never been able to get a By-Law that we were satisfied with two years in succession. On the American side the Civil Engineers have had the same difficulty. I thought our By-Law was reduced on the whole to pretty good shape, so that the Nominating Committee, as on the American side, appoints just the requisite number, and anybody else may put on anyone he likes. He surely won't get elected though, that's certain. The Nominating Committee can confer with the members of their districts, and with the local branches, and thus obtain the representation they desire.

There are two views of this proposal to ask a greater number of members to stand than are needed for the election. It is a most indelicate thing to ask two presidents to run against each other, and in a less degree it is the same for the vice-presidents. It is a very awkward thing, indeed, to ask a prominent member of this Society to put himself up as a candidate when he knows others will be up, and if he wants to be elected at all, or cares anything about it, he has to canvass or get somebody else to canvass for him. The same objection holds in a lesser degree for councillor.

The Board of Trade in Montreal, it seems to me, have a better system altogether. Up to a certain time nominations may be made by any member of the Board. Within a month or two of the elections any member may nominate another member, then the nomination closes. A ballot is then issued with the names of all those that are nominated, and every member makes his own selection. We should either do that, or put the whole thing in the hands of a judicious Nominating Committee who can study the matter for a year and give us an exact list. I do not think there is any intermediate course that is really satisfactory.

The President I understand Mr. Uniacke and Mr. White have withdrawn their motions, so there is nothing before the meeting. If there are no further resolutions, I would declare the matter closed, and disposed of to the satisfaction of the members.

Mr. Chace has been called away, and is unable to go on with the paper he was to have read this morning. It is now half past twelve. We might perhaps take up the next paper on the list. It is a paper by Professor Edwards on the "Sterilization of Water Supply."

Mr. Edwards then read his paper.

The President — Gentlemen, I am sure we are all very much obliged to Professor Edwards for the very valuable paper which he has just read. It is now nearly one o'clock, and I would suggest that the discussion be left until the afternoon meeting at three o'clock.

Before the meeting adjourns I would like to state that I have appointed the following committee to act in connection with the investigation of the charges against the Vancouver engineer: Mr. John Kennedy, Mr. C. H. Rust, Mr. G. A. Mountain, and Dr. J. Galbraith.

Mr. Mountain — With your permission, Mr. President, I would like to have my name withdrawn. I am entirely at variance with the action proposed.

The President — With the action of appointing a committee to report?

Mr. Mountain — Yes.

Mr. Rust — While I would be pleased to act, I would point out that the City Engineer of Vancouver is one of my former assistants, and I would not like to be thought biased in anything I would say about him. Probably you had better keep me off the committee. I am satisfied, from what I know of Mr. Clement, that everything he has done is perfectly honest and straightforward.

Mr. Mountain — I asked you to relieve me because I felt in taking this step the action of the Society is apt to be misconstrued. If a municipality does not want an engineer, I cannot see why they may not dismiss him.

The President — I would say it is quite in order for the committee to report on the line you have expressed, if they wish to.

Mr. Mountain — I must say I am too strongly biased to go on that committee. It would not be fair for me to go on.

A Member — Could not Mr. Mountain bring in a minority report, if he wishes, after having heard the facts?

The President — Perhaps I am at sea as to the resolution. I understood that this committee was to be appointed to look into the facts and advise the Society whether they should do anything or not; that is the view I take in connection with this. I should think Mr. Mountain's report would be of value to the Society.

Mr. Rust — I would be pleased to act, but I thought you would like to know my position.

Mr. John Kennedy — Mr. Rust's knowledge should be valuable to the committee.

Mr. Rust — Then I will act.

Dr. Galbraith — My understanding of the resolution agrees with that of the President. I have no objection to going on the committee.

The President — The printed reports of Tuesday's proceedings will be ready for this afternoon. The meeting will adjourn until three o'clock.

FOURTH SESSION, THURSDAY AFTERNOON, JANUARY 26TH, 1911.

Col. H. N. Ruttan in the chair.

The Secretary informs me that the first item on the programme is the President's address. I will be pleased to read that now, and the copies will be distributed. The President

I would move that Mr. Mountain take the chair. Col. Anderson

Mr. Mountain accordingly took the chair, and Colonel Ruttan then read his address.

PRESIDENT'S ADDRESS.

ENGINEERING AND CONSERVATION.

Engineering was some 80 years ago defined by Thomas Tredgold as "the art of directing the great sources of power in nature for the use and convenience of man."

At the beginning of the twentieth century it has become apparent not only to engineers, but to all those who have the interests of posterity at heart, that the great sources of power in nature should not only be directed, but that they should be economically managed and conserved, so that Tredgold's definition may now properly read, "The art of directing and conserving the great sources of power in nature for the use and convenience of man."

Anything approaching an exhaustive discussion on the subject, one on which volumes might be written, is not now intended. It may be pointed out that among the wastes which have been permitted throughout the past are:

(1) The impoverishment of the lands. The gradual conversion of what were productive areas into barren wastes, examples of which may be seen in older parts of Asia and Europe, and, unfortunately, to an appreciable extent, in North America.

(2) Following the exhaustion of the soil, and keeping pace with it, has been the destruction of the forests; and

(3) The unbalancing, and perhaps the lessening, of precipitation, so that rains come when they are not wanted and fail when they are indispensable for successful agriculture.

(4) The primitive and wasteful manner in which transportation lines are laid and constructed.

It is the last paragraph only with which it is proposed to deal in the present address.

The requirements of modern civilization demand not only that people be carried at express speed from one quarter of the globe to another, but that every food and fabric grown and produced be distributed broadcast for the use and convenience of man. The rush to meet these requirements has led to the abnormal development of

transportation routes, which, though good in themselves and generally advantageous, have often, with a total disregard of economic arrangement, been improperly located or needlessly multiplied in one section to the inconvenience of another.

The necessary requirements in the initiation and construction of transportation lines may be stated as follows:

(1) A thorough knowledge of the country to be served, both in its physical features and its capabilities for production.

(2) That this knowledge be utilized in the location of lines of transportation, so that the greatest service be provided at a minimum ultimate cost against the traffic using the lines.

Before going further it may be well to consider to what extent these requirements are at present met.

A study of the railway systems of any country must lead to the conclusion that no effective system of supervision has been exercised in the locations of the systems to meet the economic requirements above stated.

Much comparatively useless road has been constructed for the purpose of enabling one set of capitalists to take tolls on traffic which could have been easily handled by an existing line.

Instances appear where productive districts, separated by unproductive or partially unproductive country, are connected by lines running full length through the unproductive land, whereas a single line would have served the traffic of several converging railways. All this largely increases the capital, interest, maintenance, and management charges, which must be borne by the traffic.

Some of the causes contributing to the defective economy referred to are:

(1) Want of knowledge of the country in the construction of the first lines.

(2) The desire of capitalists to share in profits being earned by favourably situated lines.

(3) The ease with which charters for so-called competing lines may be obtained.

(4) The relatively slight interest taken by the public in the location of transportation lines, and the mistaken idea that the construction of any line is advantageous.

This deplorable state of affairs may be remedied in a most simple and inexpensive manner.

Before any companies are given franchises by Parliament, both the public and Parliament should insist upon having before them sufficient information to enable them to judge of the effect upon both public and private property of the proposed works.

This information may be best given by large scale and accurate plans of the proposed works, such as are required by the standing orders of the House of Commons in England, extracts from which are given in an appendix to this address.

In this connection attention is called to the fact that in Canada something should at once be done to arrange for surveys of the country and the preparation of plans similar to the ordnance maps of Great Britain.

A further step forward would be the giving of compulsory running rights over existing lines to companies which may properly participate in the traffic of certain districts, and which cannot do so without heavy expenditure in the construction of parallel lines, which would in themselves be unproductive or which would unnecessarily cut into business which can readily be handled by existing lines.

The remarks on granting charters to railway companies and proposed improvements in procedure apply with equal force to canals, river improvements, and hydro-electric plants.

Though Canada is noted for its magnificent canal system and for the progressive and patriotic policies of its Governments in this respect, the opening up of the country will necessitate in the immediate future a development far beyond any that has yet taken place. It is therefore most necessary that a broad and intelligent view of the whole situation be taken so that duplication of facilities be avoided and expenditure be made in the interest of, and ultimate economy in, capital and operation charges.

Numerous instances might be given illustrating great expenditures which have been made in an ill-considered and extravagant manner in the construction of railways, and of applications to Parliament for charters to construct works, which were both physically and economically impossible to carry out. These have often masked the acquisition by private parties of important assets of the public domain.

Such instances are well known to most engineers. It is therefore not necessary to refer directly to them.

It is not intended in any way to discourage development work in the country, but to point out the haphazard and expensive manner in which undertakings for the public service are often carried out, and to suggest what is considered a business-like and common-sense means of conserving, in this respect, the interest of the people at large. It must be remembered that eventually the burden falls upon, and must be borne by, the people. If the construction of an unnecessary mile of railway is prevented, or a mile already constructed is made to do the work of two, the country as a whole will be greatly benefitted.

At first it may appear that the suggested changes in initiating and carrying out public works would, if carried into effect, discourage the construction of works needed for the development of the country and its resources. This, however, would not be the

case; on the contrary, the care displayed in scrutinizing projects before they were authorized would give confidence to investors by the assurance that, in the opinion of Parliament, the works were such as were reasonable and proper, and would go far, by the confidence inspired, to facilitate the flow of capital into the country

A charter granted by Parliament under the regulations proposed would be in itself a guarantee that the project was sound and practicable. The criticism called for by these regulations should greatly assist in determining the merits of such projects.

It is, of course, apparent that, in addition to the enormous saving which could be made by the economic location and construction of works for the use and convenience of the public, there are other conditions not less important. For example, the power now possessed by companies to increase capital beyond reasonable limits, and the crude management in operation, now being so much discussed in connection with the claim of the American railways, that rates must be increased to enable them to earn revenue to meet their capital and operation expenses.

In the following conditions the last two are not purely engineering, and need not be further considered at the present time: (1) The economic location and construction of lines of transportation, (2) the limiting of capitalization within reasonable bounds, and (3) the scientific and economical operation of all transportation services, will all three have the effect of reducing rates to a minimum.

It is in the first of these that engineers are vitally interested, and their advice to clients will go a long way towards conserving immense sums of capital now wasted in crude and uneconomical locations and constructions. The word economy has no reference to detail, and is used in its broader meaning only. As to economy of designs in detail, there is no fault to be found; on the contrary, all are proud of the bridges, tunnels, and other noted structures which are being constantly turned out by the profession.

In carrying out the proposed system no cumbersome legislative machinery would be required—an amendment to the Railway Act giving the Railway Commission power to make regulations for the necessary surveys and plans, and finally to deal with the matters in question, is all that would be necessary.

EXTRACTS FROM STANDING ORDERS OF THE HOUSE OF COMMONS.

4. *Plans, Books of Reference, Sections, and Cross-sections.*

40. Every plan required to be deposited shall be drawn to a scale of not less than four inches to a mile, and shall describe the lands which may be taken or used compulsorily, or on which an improvement charge may be imposed, or which are rendered liable to the

imposition of an improvement charge, and in the case of bills of the second class, shall also describe the line or situation of the whole of the work (no alternative line or work being in any case permitted), and the lands in or through which it is to be made, maintained, varied, extended, or enlarged, or through which any communication to or from the work may be made; and where it is the intention of the promoters to apply for powers to make any lateral deviation from the line of the proposed work, the limits of such deviation shall be defined upon the plan, and all lands included within such limits shall be marked thereon; and unless the whole of such plan shall be upon a scale of not less than a quarter of an inch to every one hundred feet, an enlarged plan shall be added of any building, yard, courtyard, or land within the curtilage of any building, or of any ground cultivated as a garden, either in the line of the proposed work, or included within the limits of the said deviation, upon a scale of not less than a quarter of an inch to every one hundred feet.

41. In all cases where it is proposed to make, vary, extend, or enlarge any cut, canal, reservoir, aqueduct, or navigation, the plan shall describe the brooks and streams to be directly diverted into such intended cut, canal, reservoir, aqueduct, or navigation, or into any variation, extension, or enlargement thereof respectively, for supplying the same with water.

42. In all cases where it is proposed to make, vary, extend, or enlarge any railway, the plan shall exhibit thereon the distances in miles and furlongs from one of the termini; and a memorandum of the radius of every curve not exceeding one mile in length shall be noted on the plan in furlongs and chains; and where tunnelling as a substitute for open cutting is intended, the same shall be marked by a dotted line on the plan, and no work shall be shown as tunnelling in the making of which it will be necessary to cut through or remove the surface soil.

43. If it be intended to divert, widen, or narrow any public carriage road, navigable river, canal, or railway, the course of such diversion, and the extent of such widening or narrowing shall be marked upon the plan, and, if it be intended to divert any public footpath, the course of such diversion shall be marked upon the plan.

44. When a railway is intended to form a junction with an existing or authorized line of railway, the course of such existing or authorized line of railway shall be shown on the deposited plan for a distance of 800 yards on either side of the proposed junction, on the same scale as the scale of the general plan.

48. In cases of bills for improving the navigation of any river, there shall be a section which shall specify the levels of both banks of such river; and where any alteration is intended to be made

therein it shall describe the same by feet and inches, or decimal parts of a foot.

49. In every section of a railway the line of the railway marked thereon shall correspond with the upper surface of the rails.

50. Distances on the datum line shall be marked in miles and furlongs, to correspond with those on the plan; a vertical measure from the datum line to the line of the railway shall be marked in feet and inches, or decimal parts of a foot, at the commencement and termination of the railway, and at each change of the gradient or inclination thereof; and the proportion or rate of inclination between every two consecutive vertical measures shall also be marked.

51. Wherever the line of the railway is intended to cross any public carriage road, navigable river, canal, or railway, the height of the railway over or depth under the surface thereof, and the height and span of every arch of all bridges and viaducts by which the railway will be carried over the same, shall be marked in figures at every crossing thereof; and where the railway will be carried across any such public carriage road or railway, on the level thereof, such crossing shall be so described on the section; and it shall also be stated if such level will be unaltered.

52. If any alteration be intended in the water-level of any canal, or in the level or rate of inclination of any public carriage road or railway, which will be crossed by the line of railway, then the same shall be stated on the section, and each alteration shall be numbered; and cross-sections, in reference to the numbers, on a horizontal scale of not less than one inch to every three hundred and thirty feet, and on a vertical scale of not less than one inch to every forty feet, shall be added, which shall show the present surface of such road, canal, or railway, and the intended surface thereof, when altered; and the greatest of the present and intended rates of inclination of the portion of such road or railway intended to be altered, shall also be marked in figures thereon; and where any public carriage road is crossed on the level, a cross-section of such road shall also be added; and all such cross-sections shall extend for two hundred yards on each side of the centre line of the railway.

55. When a railway is intended to form a junction with an existing or authorized line of railway, the gradient of such existing or authorized line of railway shall be shown on the deposited section, and in connection therewith and on the same scale as the general section, for a distance of 800 yards on either side of the point of junction.

5. *Estimates and Deposit of Money, and Declarations in Certain Cases.*

56. An estimate of the expense of the undertaking under each bill of the second class shall be made and signed by the person making the same.

Prof. Durley

PROF. R. J. DURLEY.—I think that the Society is to be congratulated, not only on the very successful year which it has had under Colonel Ruttan's presidency, but also on the address which he has given us at the conclusion of his year of office. The address is, if anything, too brief, and we wish it had been longer, for it deals with questions which are of the greatest importance to the people of Canada. It is no mere collection of platitudes, but, in my opinion, affords a great deal of food for thought, and is an excellent example of the kind of advice and instruction which should be given by the engineering profession to the public. I should like to move a very hearty vote of thanks to Colonel Ruttan for the address which he has just read.

Mr. W. Kennedy, Jr.

I would like to second the motion which has been proposed by Prof. Durley. I think that this matter is very timely in its presentation, especially as the Railway Commission now has power to regulate rates and to control the business of the railways and other transportation companies. There is now no danger that a line located in any particular place will be in a position to prey upon the public. Although this address is very short, I think it has initiated a good subject, and one that requires a great deal of thought and study. I have much pleasure in seconding the motion.

Mr. Mountain

You have heard the motion proposed by Professor Durley, seconded by Mr. William Kennedy, Jr., that a hearty vote of thanks be extended Colonel Ruttan for his address. I might say, before I put the motion, that it gives me great pleasure to have been present at this Annual Meeting presided over by Colonel Ruttan. I have sat with him on many occasions in the Council, and he has added dignity and courtesy to that body. It is a great pleasure to all of us to have been with him in this city during this year. In my opinion he has had the banner year of the Society, and I feel proud that I was the mover in the Council of the resolution to hold the Annual Meeting at Winnipeg.

While it is not proper to discuss the President's address, I may be permitted to say that this is a live question at the present moment. In fact, it is agitating the House of Commons now in Ottawa, and is being taken up very much along the lines mentioned by Colonel Ruttan. I therefore put the motion for a hearty vote of thanks to the President.

Colonel Ruttan, you have heard the applause from the members of the Society for your very able address. I may say that the Society wishes you every success, and trusts that you will be able to serve on the Council for many years to come.

The President

Mr. Chairman and gentlemen, in thanking you for the very kind manner in which you have received this address, I may say a word of apology as to its length, or rather as to its shortness.

These questions are so large that when I came to write the address I found that if I were going thoroughly into detail it would be much too long for any occasion of this kind. I had the choice of doing that or of making it simply a text, which could be discussed and enlarged upon in the future, if there was anything in it worthy of attention. I thank you, Mr. Chairman, for the kind expression of your opinion as to the Winnipeg Convention. I have not been at very many of the conventions, but I think with you that this certainly has not been behind any of them, and I hope—I cannot expect to have you here every year—but I hope in the near future you will be able to come here again, and we will be able perhaps to give you even a better reception and better facilities for meeting than at the present time.

Colonel Ruttan then resumed the chair.

I will now ask Mr. Chace to read his paper on "The Municipal Hydro-Electric Works of the City of Winnipeg at Point du Bois Falls."

Mr. Chace — Mr. Chace asked that the paper be considered as read, but gave a synopsis of it and explained a number of lantern slides.

The President — If there is no discussion, will some one please move a vote of thanks for the paper we have all so much enjoyed? I am sure that we appreciate the great amount of work devoted to the preparation of a paper of this kind. We realize that in Winnipeg, because we have been fully in touch with this work, and have seen its progress from time to time.

Mr. Uniacke — Mr. President, I have much pleasure in moving a vote of thanks to Mr. Chace for his highly interesting and instructive paper. I am sure it is very valuable information to the members present.

The President — Any further discussion? Gentlemen, you have heard the motion that a vote of thanks be given Mr. Chace for this paper. Please express your appreciation in the usual way.

Mr. Chace, I have very much pleasure in conveying to you the very sincere thanks of this gathering for the very valuable and interesting paper you have just read.

Mr. Chace — Mr. Chace.—Thank you, Mr. President and gentlemen.

The President — Has any member any further business to bring before the meeting?

On motion by Mr. J. G. Legrand, the meeting adjourned at 4.50 p.m.

Fifth Session, Friday Morning, January 27th, 1911.

Col. H. N. Ruttan in the Chair.

The President — The first order of business is the appointment of the Nominating Committee under By-Law 36.

The procedure for these nominations is prescribed by the Council. The several branches were invited to suggest names for the districts which they represent. The proposal for district No. I is made by the members of the Council resident at headquarters, and the name recommended is Mr. J. M. R. Fairbairn. The Secretary

No regular means have been adopted to get a suggestion for district No. 2. This comprises the lower provinces and the United States. The Montreal members of Council suggest the name of name of Professor E. A. Stone, of the University of New Brunswick, but possibly some of the representatives of that district present may wish to put up another name. The Quebec branch recommends Mr. A. R. Decary for district No. 3. The Ottawa branch recommends Mr. James White for district No. 4. The Toronto Branch recommends Mr. A. C. D. Blanchard for district No. 5. No suggestions for nominations have been received for districts Nos. 6 and 7.

Has Professor Brydone-Jack any nominations for district No. 6, Manitoba? The President

I nominate Mr. J. A. Hesketh. Prof. Brydone-Jack

Will someone from the West suggest a name for district No. 7? The President

I would recommend Mr. C. E. Cartwright, of Vancouver. Mr. Kennedy

Are there any other suggestions in connection with these nominations? District No. 2 seems to be the only one that the Council is not quite sure about. That is New Brunswick, the Lower Provinces, and the United States; if there is no objection I would suggest that someone move to confirm the names submitted. The President

I move that the names suggested as the Nominating Committee for the current year be approved. Mr. Mountain

I second it. Mr. John Kennedy

Moved by Mr. Mountain and seconded by Mr. John Kennedy, that the names as read be confirmed. The President

Carried.

The next item is the naming of the Good Roads Committee; it would be very difficult to do that in a meeting like the present, and it might be well to consider leaving that nomination to the incoming Council, and not take the time now. What is your pleasure in connection with the Good Roads Committee, gentlemen?

I move that the matter be left to the incoming Council. Mr. J. Kennedy

I second that. Mr. Duggan

Carried. The President

The next item is the report of the Committee *re* the Vancouver City Engineer.

The Committee has carefully considered this rather complex question, and has come to the conclusion that we really should not interfere with it. It is, in the first place, contrary to our Mr. John Kennedy

precedents. The several cases of the kind which have previously come up have not been quite so formal as this, but the Society has always felt it impracticable to take any action as such would be contrary to the spirit of our Constitution and the whole attitude of the Society. That is to say, we are a scientific body and not a trade union. And then in discussing the matter more fully with the Vancouver members who are familiar with the matter, and from reading the newspaper accounts, we felt that it was a controverted question, and although there was nothing in the world against the character of our professional brother, Mr. Clement, yet there were questions as to his efficiency, and after all it settles down to the question as to whether we have a right to interfere between an engineer and his employers; whether they are not justified in saying, rightly or wrongly, that they do not want a certain employee. It appears Mr. Clement is not dismissed, but that they are considering whether they shall make a different arrangement and perhaps have some other engineer over him. In view of all these circumstances, we came to the conclusion that we could not recommend any interference on the part of this Society. One other consideration is that it was urged that Mr. Clement had not been fairly treated inasmuch as he had no opportunity of replying at the investigation, and no opportunity to be heard. In so far as we are concerned, the Council of Vancouver has also not been heard, and to treat the matter fairly, we should put the parties to the dispute in the same position. We have therefore felt that it is impracticable for the Society to deal with the matter at all, however strongly we may personally feel, as to any unfair treatment of Mr. Clement. I suppose we have all been subject to some such condition and had to fight through it as best we could. Mr. Mountain has a resolution in his hands, and he has kindly promised to read it for me.

Mr. Mountain — Mr. President, your Committee begs unanimously to report that the Society has not hitherto dealt with questions which have arisen between its members and their employers, and that there appears to be no sufficient reason why it should do so in the present case. Signed: John Kennedy, Chairman; John Galbraith, Charles H. Rust, and G. A. Mountain.

The President — Gentlemen, you have heard the resolution, what is your pleasure?

Mr. White — Before you vote on this I should like to say a few words. I moved a resolution respecting this matter, seconded by Professor Edwards, and the discussion was participated in by a number of others. A Committee was appointed consisting of four gentlemen who had all expressed their opposition to the proposal. Under the circumstances it is not surprising to me that the Committee was

unanimous. I think it is regrettable that the matter was dealt with in that way; but that is not the point. The point is merely that Mr. Clement was refused an investigation. There is no question whatever of his competency or incompetency. There is no question as to whether the city of Vancouver had a right to dismiss him or reduce his salary; they could take whatever action they might see fit. But I do not think it is giving a man fair play to refuse him an investigation. It has been said that the city's side of the case has not been heard. The city's side of the case certainly, so far as it affects the question of his competency or the reverse, has not been heard; it is not necessary that it should be heard. The only question is whether the Society should or should not take action with respect to the action of the city of Vancouver in refusing him the investigation he had urged, and to which in any case he is certainly entitled.

I propose to move an amendment: "That this Society regrets that the City Council of Vancouver has refused to grant their City Engineer the investigation requested by him.

I second that. A Member

My name stands connected with this matter as being the seconder of the first motion. I think a few of Mr. White's remarks were a bit unfair to the Committee. It is not my recollection that the four gentlemen expressed themselves as being quite opposed to the matter at the time; I think one member spoke quite frankly as being opposed to the principle, and the other gentlemen expressed themselves as having an intimate acquaintance with the gentleman in question, and, in fact, of having a personal affection for him. As the seconder of the original motion I would like to put myself on record as being in favour of the Committee's report. Prof. Edwards

Any further discussion? The President

I thought that yesterday's resolutions were all withdrawn and a Committee appointed, and that the action this morning would be on the question of receiving the Committee's report, and not as an amendment to anything of yesterday's proceedings. Mr. John Kennedy

I think you are quite right in that, Mr. Kennedy. Mr. White's amendment is now moved in opposition to the adoption of the Committee's report. There is nothing of yesterday's discussion remaining. Are you ready for the question, gentlemen? The President

I think I should at least thank Mr. White for the resolution he has brought in both yesterday and to-day. After discussing the question with the Committee that was appointed last evening, I cannot see my way clear to vote for Mr. White's resolution. I think I stated clearly enough yesterday that we have great sympathy for Mr. Clement, and that everybody in the Vancouver district has also, but I have to confess also that I would not like to be a party to any Mr. J. C. Kennedy

interfering between employer and employee. The resolution this morning is greatly modified, and there is one result I hope will come out of the discussion, and that is, that the action of the City Council, if the case has been as reported, does not find favour with the engineers present at this meeting.

The President — Any further discussion? If not, I will put the amendment first.

Mr. McCarthy — MR. G. A. MCCARTHY.—As I understand the matter, any action taken at this meeting will not go any further than the records of the Society.

The President — There is nothing in the motion or the amendment requiring any further action. I will put the amendment first.

All in favour of the amendment kindly make a show of hands.

The Secretary — I make it 26.

The President — All against the amendment please stand up.

The Secretary — I make it 24.

The President — I declare the amendment carried, 26 to 24.

Mr. White — I move that a copy of that resolution be sent to the City Council of Vancouver.

Mr. McCarthy — Gentlemen, we are getting on delicate ground. It is all right for the Society to put on their records a resolution of that nature, but certainly we should not communicate with the City Council of Vancouver any more than we should communicate with the Canadian Pacific Railway in the event of their dismissing any of their employees, if they were so disposed. The conditions are absolutely the same; the action of a municipal council dismissing an engineer should receive no more attention from us than any similar action by any other corporation.

Mr. White — I rise to a point of order. I think the only business before this meeting is whether this should be sent to the City Council of Vancouver. It is not a question of whether it is right or wrong.

The President — That is right. It has been moved by Mr. White that a copy of the resolution which has just been passed be forwarded to the City Council of Vancouver. Any seconder to that?

Mr. Ferguson — MR. FERGUSON.—I second that.

Prof. Edwards — Is it possible that this matter might be left over until more members are present?

The President — This is a full meeting of the Society so far as we can make it one. There is not one-half nor one-third of the members present at the moment. But I do not see that that can be helped. Are you ready for the question?

Mr. J. C. Kennedy — I would like to say, Mr. President, that I would like Mr. White to withdraw that request. I would very much rather see the copy of the resolution sent to the City Engineer. If the resolution is published, I do not think it will be very long until the news gets to Vancouver, and the Council and all the people will know about it.

Mr. President, I would say that I feel myself obliged to vote against the motion of Mr. White to send a copy of the resolution to the Vancouver City Council, for this reason: Our resolution would be either ignored, or we would receive an answer from the Council of Vancouver which would put the Society in a very undignified position. I would suggest, if there is any movement of that kind, that it be sent to the Vancouver branch of this Society. Mr. Uniacke

I wish to amend my resolution along the lines suggested by Mr. Kennedy, and that is that a copy of the resolution be sent to the City Engineer of Vancouver. Mr. White

Gentlemen, you have heard the motion. Are you ready for the question? The President

I think, Mr. President, we ought to just let this matter drop with the record on the books. We are meddling between employers and employees in a way that we ought not. A mere resolution put upon our books like the former one does not do us much harm. If it is sent to the engineer he will surely make use of it, and put it in the papers, and the result would be just the same. We would be in the position of meddling with matters we have no business with, and publishing it to the world, too. I think that it would be better to let the matter drop. Mr. John Kennedy

Prof. E. P. Fetherstonhaugh.—I would like to ask if there is any precedent in the previous acts of the Society for taking any steps in such a matter as this. It seems to me that Canadian engineers have for a great many years been endeavoring to raise the standard of the profession and raise the standard of this Society, and to prevent its being regarded by the public as a trades union or a society formed for the purpose of protecting people in their relations with their employers. It is a technical society pure and simple, and I think it is a great mistake if we take the step at the present time of starting to interfere between employees and employers. Prof. E. P. Fetherstonhaugh

Is there any further discussion? I might just say, gentlemen, that I agree entirely with the report made by the committee on this matter—not that I do not sympathize with Mr. Clement. I do not suppose there is any member of this Society who has had more experience in this kind of thing than I have had personally, and I would very much regret to have to appeal to the Society to go out of its legitimate business to interfere between myself and my employers. However, that is neither here nor there. Mr. Uniacke's remarks, I think, are most pertinent, and I think the Society would place itself in a very unenviable position if this matter were carried any further. All in favour of Mr. White's motion that a copy of the resolution be sent to the City Engineer of Vancouver, please stand up. The President

Was that accepted by the seconder? Mr. John Kennedy

Mr. Ferguson — Yes.

The Secretary — Thirteen.

The President — Contrary, please stand up.

The motion is lost.

There is a paper on "The Cobalt Power Scheme," to be read by Mr. Munro. I might say that, as our time is very limited, fifteen minutes has been allotted to that paper.

(The paper was read by Mr. Munro and illustrated by stereopticon views.)

Mr. John Kennedy — I move a vote of thanks for this excellent paper.

Mr. Legrand — MR. J. G. LEGRAND.—I second that motion.

The President — It has been moved by Mr. John Kennedy and seconded by Mr. Legrand, that a hearty vote of thanks be tendered to Mr. Munro for the very interesting paper he has read.

Carried.

I have very much pleasure in conveying to you the thanks of the Society for the paper which you have just read, Mr. Munro.

The next business is the receiving of the report of the Scrutineers.

The Secretary read the report on the ballot for amendment to By-Laws as follows: "We, your Scrutineers, beg to report that all the various amendments to By-Laws, as per attached list, have been carried by the requisite majority. (Signed) J. G. Legrand (Chairman), F. P. Shearwood, T. W. White, H. A. Bowman, M. P. Blair."

The President — Gentlemen, what is your pleasure with this report?

Mr. John Kennedy — I move that it be received and adopted.

Mr. Mountain — I second that.

Carried.

Mr. John Kennedy — The motion includes the destruction of the ballot.

The President — Yes. The report of the Scrutineers as to the election of officers will now be read.

The Secretary — The report of the Scrutineers is in the form of the number of votes cast for each candidate. The votes cast for President, electing Mr C. H. Rust, were 348. The votes cast for Vice-Presidents were: Mr. Holgate, 319; Mr. Dodwell, 333; Mr. Schwitzer, 322. There were other members voted for, the votes ranging from one to ten. Would you like to have the names read?

The President — Just those who were elected.

The Secretary — The votes cast for Councillor for District No. 1 are as follows: L. A. Herdt, 337; Phelps Johnson, 339; H. G. Kelley, 341; J. M. Shanly, 338; J. G. Sullivan, 340; H. H. Vaughan, 335. There were scattering votes for six others.

For District No. 2: P. S. Archibald, 342; F. W. W. Doane, 342; R. McColl, 340. Scattering votes for six others.

For District No. 3: E. A. Doucet, 342; J. T. Morkill, 341; P. E. Parent, 340. Scattering votes for four others.

For District No. 4: C. R. Coutlee, 237; D. McPherson, 198; W. J. Stewart, 192. There are three others who received high votes: S. J. Chapleau, 99; A. A. Dion, 89; R. F. Uniacke, 79; and there were scattering votes for three others.

For District No. 5: H. E. T. Haultain, 343; R. B. Rogers, 289; A. F. Stewart, 233; C. L. Fellowes, 31. An error was made by the Nominating Committee in nominating Mr. Rogers, who, unfortunately, resides outside of the district.

What would be the decision in that case? Dr. Galbraith

As Mr. Rogers does not reside within the district, his election cannot of course be confirmed. The three elected are Messrs. Haultain, Stewart, and Fellowes. The President

There are also scattering votes for twelve others. The Secretary

For District No. 6 the votes are: E. E. Brydone-Jack, 340; J. A. Hesketh, 339; J. G. Legrand, 336; with scattering votes for eight others.

For District No. 7 the votes are: F. F. Busteed, 342; J. S. Dennis, 343; J. C. Kennedy, 337; with scattering votes for seven others. (Signed) E. P. Fetherstonhaugh, G. E. Howie, A. R. Dufresne, L. B. Elliot.

I would ask the Secretary to be good enough to read a telegram from the Montreal solicitor with reference to the election of the Vice-President. The President

On the instruction of the members of Council present at the meeting, I sent a telegram to Mr. A. Falconer, who is the legal adviser of the Society, in Montreal, regarding the election of Mr. Schwitzer as a Vice-President. His reply was somewhat lacking in definiteness, and in a second wire I asked him to look into the matter further. He replies: "Montreal, January 26th, 1911. Have given question further examination and consideration, and am strongly confirmed in opinion that there was no election, and retiring Vice-President holds over. Am also of opinion that By-Laws do not permit of special election, and that retiring Vice-President must remain in office for another year unless he resigns. (Signed) A. Falconer." The Secretary

What we should do at present is to declare the first two elected, and leave the matter open for further consideration of the Council before action can be taken. The President

It requires that the former Vice-President shall remain in office, but there were three Vice-Presidents. Mr. John Kennedy

Yes, that is the dubious point. The Secretary

There are a great many points which will require to be carefully looked into before that matter can be decided, and if at present we declare the two first Vice-Presidents elected I think that is about as far as we can go. I would ask the Secretary to read out the names The President

of the Officers and Councillors who have been elected, when a motion confirming that election will be in order.

The Secretary — As President, Mr. C. H. Rust; as Vice-Presidents, Messrs. H. Holgate and C. E. W. Dodwell; as Councillors representing District No. 1, Messrs. L. A. Herdt, P. Johnson, H. G. Kelley, J. M. Shanly, J. G. Sullivan, H. H. Vaughan; District No. 2, P. S. Archibald, F. W. W. Doane, R. McColl; District No. 3, A. E. Doucet, J. T. Morkill, P. E. Parent; District No. 4, C. R. Coutlee, D. MacPherson, and W. J. Stewart; District No. 5, Messrs. H. E. T. Haultain, A. F. Stewart and C. L. Fellowes; District No. 6, Messrs. E. E. Brydone-Jack, J. A. Hesketh, and J. G. Legrand; District No. 7, Messrs. F. F. Busteed, J. S. Dennis, and J. C. Kennedy.

The President — Would someone move a resolution confirming the election of these gentlemen and asking for the destruction of the ballots?

Mr. Shearwood — I have much pleasure in moving that resolution, including the destruction of the ballots.

Mr. McCarthy — I second that.

The President — Carried.

I would now ask Mr. Rust, the newly-elected President, to take the chair.

Mr. Rust — Gentlemen, I can hardly find words to express to you my appreciation in being elected to this very high position. I little thought when I became a member of this Society in 1887 that I would ever attain this eminence. I can assure you I will do the utmost I can to further the interests of the Society. I thank you, gentlemen.

Now, gentlemen, we have some votes of thanks to move, and the first one is to the Canadian Pacific Railway. Dr. Galbraith, will you kindly make this motion?

Dr. Galbraith — Mr. President, I have very much pleasure in being charged with the moving of this vote of thanks. If it had not been for the generosity of the Canadian Pacific Railway Company, the meeting in Winnipeg would not have been what Winnipeg deserves. Their kindness in giving free haulage of the train from Montreal and Toronto, conveying our western members to the meeting free of charge, and in giving us the train to Lac du Bonnet is one that I am sure this Society is deeply grateful for. It is true that engineers have done a great deal for the Canadian Pacific Railway, but it is also true that the Canadian Pacific Railway has done a great deal for engineers. I have much pleasure, then, in moving this vote of thanks, and I am quite sure it will be heartily adopted by the meeting. (Applause.)

Mr. McCarthy — I second that motion.

The President — You have heard the resolution, gentlemen. What is your pleasure?

Carried.

The next vote of thanks to be tendered is to the Mayor, Alder- The President
men, and Board of Control of the city of Winnipeg.

The pleasant duty devolves upon me for moving this vote of Mr. Mountain
thanks. I am sure I voice the feelings of the entire meeting when I say how much we are indebted to the kindness and courtesy of the Mayor and Aldermen and Board of Control of the city of Winnipeg for the magnificent reception they gave us at the luncheon on the opening day. It was a grand affair; we never had anything like it in the history of this Society. They also extended to us an opportunity of visiting the Point du Bois municipal works, and seeing that splendid construction was an education in itself. I have much pleasure in moving a vote of thanks to the Mayor, the Aldermen, and the Board of Control of the city of Winnipeg.

I have much pleasure in seconding this motion, and would like Mr. Lamb
to say that, as the Mayor and Aldermen of the city of Winnipeg represent the citizens, the magnificent reception which they have assisted so materially in giving us is only one more sample of the whole-souled manner in which the western people, and particularly the people of Winnipeg, do things. I have great pleasure in seconding this resolution. (Applause.)

You have heard this resolution, gentlemen. What is your The President
pleasure?

Resolution carried.

The next is the vote of thanks to the officers and members of the Manitoba Branch of this Society.

Mr. President and gentlemen, I have pleasure in moving a vote of Mr. Duggan
thanks to the officers and members of the Manitoba Branch of this Society. We are a very large number of visiting members, more, probably, than on any previous occasion, and I have heard nothing but praise from the visiting members for the perfection of the arrangements of the Manitoba Branch, their hospitality and the excellence of our entertainment—the subject has quite taken the place of the weather. The first day or two, when one met a visitor, he said, "Isn't it cold?" Now, the first greeting is, "How well things are going, and what splendid entertainment is provided for us."

Personally, it has been my misfortune to be far removed from the activities of the Society for a good many years, and, so far as the Society is concerned, I come to this meeting as a Rip Van Winkle, asleep for the last ten years. The visiting members can, I am sure, appreciate how pleasant it is to awake and renew associations under the hospitable influences of the Manitoba Branch. I therefore have particular pleasure in moving a hearty vote of thanks to the Manitoba Branch.

Mr. Norman McLeod.—I second that. Mr. N. McLeod

Before that resolution is put, may I add a word of thanks to the Prof. McLeod
members of this Branch who have given their assistance to myself

as Secretary. That assistance has been most admirable, and left us with almost nothing to do, and I am personally under many obligations to these gentlemen, and wish to take this opportunity of thanking them.

Motion carried.

Mr. Dancer — I have very much pleasure in thanking the meeting for the manner in which this motion has been received, on behalf of the Manitoba Branch, and I would like to express our feelings at having the meeting held here, and the high sense of the honour conferred on us by this, the twenty-fifth Annual Meeting, being held in Winnipeg. When we first heard that the meeting was to be held in Winnipeg we determined to do our best to make it the most successful meeting of the twenty-five. We also felt it due as a tribute to the Society and to our President, Colonel Ruttan. If we have met with any success, it is owing to the efforts, in the first place, of our late comrade, J. E. Schwitzer, who induced the Canadian Pacific Railway to give free transportation, and also to our local Secretary, Professor Brydone-Jack, and to the members of the committees who were appointed to look after the details, and who gave time and services so willingly for the good work. We trust the members will take away with them such kindly remembrances of Winnipeg that they will be induced to visit us again before long, and I am sure they will receive a hearty welcome. (Applause.)

The President — The next vote of thanks is to the Grand Trunk Pacific Railway, to the Railways of the Eastern Passenger Association, and to the Canadian Northern Railway.

Mr. Dill — I move a vote of thanks to the Grand Trunk Pacific Railway, the Canadian Northern Railway, and the railways of the Eastern Passenger Association for the many privileges and courtesies extended to this Society on this, its 25th Annual Meeting.

Mr. Powell — Mr. G. G. Powell.—I second that motion.

Carried.

The President — The next is a vote of thanks to the Winnipeg Electric Railway Company.

Mr. White — I have much pleasure in moving, seconded by Mr. Cartwright, that a vote of thanks be tendered to the Winnipeg Electric Railway Company for the courtesies extended by them during the twenty-fifth Annual Meeting of the Society.

Mr. Cartwright — I have much pleasure in seconding this motion.

Carried.

The President — The last, but not the least, is the vote of thanks to the Manitoba Club for their hospitality extended to us.

Mr. Uniacke — It is my pleasure to move a vote of thanks to the Manitoba Club for the courtesy and hospitality extended by them to us during our visit to Winnipeg. It has frequently been my pleasure and privilege

to be entertained at this happy home on my visits here on other occasions. I know that I am voicing the sentiments of this Society when I say that the privileges extended the Manitoba Club, through the influence and kind hospitality of our retiring President, have been most appreciated during our visit to Winnipeg. (Applause.)

Mr. White

I have pleasure in seconding the motion.

Carried.

Mr. John Kennedy

I have been waiting for a resolution of thanks to the retiring President. I think we owe a great deal of gratitude to him for the admirable way in which he has presided over the doings of the Society during the past year, and we have felt his hand in everything during this very successful meeting. I think it was due to the Society to have a prominent municipal engineer as President, and Mr. Ruttan has certainly fulfilled our utmost desires in that respect.

Mr. Mountain

I have much pleasure in seconding the motion of Mr. Kennedy. I am sure I again voice the unanimous feelings of the Society that we ought to be congratulated on the manner in which the retiring President carried the Society through his year. I have much pleasure in seconding that motion.

Carried.

The President

Colonel Ruttan, I wish to convey to you the vote of thanks of this Society in appreciation of your efforts as President.

Col. Ruttan

Mr. President, I thank you very sincerely for the kind words which you have spoken, and for the way in which the vote of thanks has been given by the meeting. It has been a pleasure and a delight to me, and I am sure to the members of the Winnipeg Branch, to have you with us, and we have done our best to make your stay pleasant. There is only one thing, which, perhaps, I may do as my first act after vacating the honoured position which you now occupy, and that is to move a vote of thanks to the ladies of the Women's Canadian Club of Winnipeg, who were so kind as to give a musical entertainment for the Society on Tuesday evening last. (Applause.)

Dr. Galbraith

I have much pleasure in seconding the vote of thanks to the Women's Canadian Club. I am sure that our wives and daughters and sweethearts as well as ourselves owe a great deal of the pleasure of this meeting to the kindness of the ladies of Winnipeg.

Carried.

The President

Is there any other business to bring up?

Mr. McCarthy

I would like to ask up to what date the transactions of the Society have been printed and distributed?

The Secretary

The first volume of the last year (1910). The second volume is not printed.

Mr. McCarthy

I would like to move that the same procedure be adopted as is followed by the American Society, and that is, that a card be sent

to the members asking all who receive the proceedings if they would wish them bound.

The Secretary — That is supposed to be the arrangement, but possibly we are at fault in not having notified the membership in recent years. There is an old and standing arrangement that any member who desires to have his volumes bound can do so upon paying the cost of binding.

Mr. McCarthy — I wish I had known it. I have been a member of the Society for a number of years, and did not know it before.

The President — We will now declare the meeting of the Society closed.

The meeting adjourned at 11.15 a.m.

The

Canadian Society of Civil Engineers

413 DORCHESTER STREET WEST, MONTREAL.

Established Feb 24, 1887 ; Incorporated by Dominion Act, June 23rd, 1887

(50 VIC., CAP. 124)

Report of Annual Meeting

1912

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VOLUME XXVI

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PRINTED FOR THE SOCIETY
AT THE WITNESS PRESS

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The Canadian Society of Civil Engineers

REPORT OF PROCEEDINGS OF THE TWENTY-SIXTH ANNUAL MEETING, HELD AT THE ROOMS OF THE SOCIETY, 413 DORCHESTER STREET WEST, MONTREAL, 24TH TO 26TH JANUARY, 1912.

The President, Mr. C. H. Rust, in the chair.

MORNING SESSION, 24TH JANUARY, 1912.

At 10 A.M. the meeting was called to order by the President.

MR. C. H. RUST.—The first order of business, gentlemen, is the reading of the minutes of the last Annual Meeting. The Secretary will read the minutes. The President

The minutes of the last Annual Meeting were read by the Secretary and confirmed.

A resolution to delete a portion of the minutes of the last Annual Meeting was moved by Mr. G. A. Mountain, and seconded by Mr. J. G. LeGrand. The motion, on being put to the meeting, was lost.

Mr. H. H. Vaughan moved, seconded by Mr. James White, that the discussion in connection with Mr. Mountain's motion be eliminated from the minutes of the meeting or from any reports thereon.

A standing vote was taken, and the President declared the motion carried.

The next business is the appointment of scrutineers. Subject to the approval of the meeting, I would name Messrs. C. S. Leech, E. Mauer and R. C. F. Alexander as scrutineers of the ballot for officers and members of Council, and Messrs. H. B. Stuart, J. Openshaw and C. A. Meadows as scrutineers of the ballot for amendment to By-Laws. The President

Carried.

The Report of Council is the next order of business. The President

REPORT OF COUNCIL FOR THE YEAR 1911

The Council presents the following report on the work of the Society during the past year:

Roll of the Society.

The elections took place as follows: Nine Members, eighty-four Associate Members, one Associate, twenty-seven Juniors, one hundred and thirty-four Students; in all two hundred and fifty-five.

Twenty-two Associate Members were transferred to the class of Member, one Associate was transferred to the class of Associate Member, two Juniors were transferred to the class of Associate Member, twenty-seven Students were transferred to the class of Associate Member, twenty-five Students were transferred to the class of Junior.

There have been seven deaths: four Members, one Associate Member, one Associate, and one Student. There have been removed from the rolls by resignation and on account of non-payment of dues, five Members, twenty-three Associate Members, three Associates, and eighty Students.

At present the membership stands as follows:

Hon. Members	14
Members	562
Associate Members	1,083
Associates	39
Juniors	54
Students	1,130
Total	2,882

At the same time last year the total Membership was as follows:

Hon. Members	14
Members	548
Associate Members	949
Associates	43
Students	1,185
Total	2,739

Annual Meeting.

The twenty-fifth Annual Meeting was held in the Royal Alexandra Hotel, Winnipeg, on the 24th, 25th, and 26th January, 1911, under the presidency of Mr. H. N. Ruttan.

The first session was called to order on Tuesday, January 24th, at 10 a.m., and the meeting was adjourned on Friday, January 27th.

Meetings.

The Council has held fourteen meetings during the year. There have been eight sectional meetings and four general or monthly meetings of the Society.

The following papers and addresses were presented:

General Section:

"The Sterilization of a Public Water Supply," by W. Muir Edwards, A. M. Can. Soc. C. E. (Read at the Annual Meeting in Winnipeg.)

"Aesthetics in Bridge Design," by C. R. Young, A. M. Can. Soc. C. E.

"The Upper St. Lawrence, Its International History, Development of Navigation and Future Possibilities," by Henry Holgate, M. Can. Soc. C. E.

"Notes on the Regulation of the River Nile," by A. W. Robinson, M. Can. Soc. C. E.

"Underground Conduit Construction," (illustrated by motion photographs), by Mr. Guy M. Gest.

Electrical Section:

"The Development of Efficiency in High Tension Transmission Insulators," by A. O. Austin.

"The Municipal Hydro-Electric Works of the City of Winnipeg, at Point du Bois Falls," by W. G. Chace, A. M. Can. Soc. C. E. (Read at the Annual Meeting in Winnipeg.)

"The Hydro-Electric Power Development of the British Canadian Power Company," by Messrs. N. R. Gibson, A. M. Can. Soc. C. E., S. M. Waldron, S. Can. Soc. C. E., and A. L. Mudge, A. M. Can. Soc. C. E. (Read at the Annual Meeting in Winnipeg.)

"The Operation, Construction, Application, and Characteristics of Induction Motors," by A. Miller Gray, A. M. Can. Soc. C. E.

"The Illinois Traction System," by Fred H. Williams, S. Can. Soc. C. E. (Read at a monthly meeting.)

"The Southern Power Company's Transmission Lines," by J. W. Fraser.

Mechanical Section:

"Recent Advances in Tool Construction," by Alex. Bertram, M. Can. Soc. C. E.

"The Construction and Operation of the Janney Universal Variable Transmission Device," by Mr. R. Newman. (Read at a monthly meeting.)

"Pneumatic Caisson Foundations for Tall Buildings," by Alex. Allaire, A. M. Can. Soc. C. E.

BRANCH SOCIETIES.

The several branches of the Society are as follows:

Vancouver—Headquarters, McGill College University.
Chairman, G. H. Webster.
Secy.-Treas., H. K. Dutcher.

Manitoba —Headquarters, University of Manitoba, Winnipeg.
Chairman, C. H. Dancer.
Secy.-Treas., E. E. Brydone-Jack.

Toronto —Headquarters, Engineers' Club, King Street West.
Chairman, H. E. T. Haultain.
Secy.-Treas., E. A. James.

Ottawa —Headquarters, 177 Sparks Street.
Chairman, A. A. Dion.
Secy.-Treas., H. V. Brayley.

Kingston —Headquarters, School of Mines.
Chairman, A. K. Kirkpatrick.
Secy.-Treas., L. W. Gill.

Quebec —Headquarters, City Hall.
Chairman, P. E. Parent.
Secy.-Treas., S. S. Oliver.

COMMITTEES.

The following have been the Committees of Council during the year:

Library and House Committee:

L. A. Herdt, Chairman.
James White.
F. P. Shearwood.
R. S. Lea.
J. M. R. Fairbairn.

Finance Committee:

J. M. Shanly, Chairman.
C. N. Monsarrat.
G. H. Duggan.
W. J. Francis.
E. Marceau.

The Gzowski Medal Committee:

R. S. Lea, Chairman.
E. E. Brydone-Jack.
W. J. Stewart.
A. E. Doucet.
J. Galbraith.

OFFICERS OF SECTIONS.

General:

Phelps Johnson, Chairman.
H. M. MacKay, Vice-Chairman.

Electrical:

L. A. Herdt, Chairman.
R. M. Wilson, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
W. J. Francis, Vice-Chairman.

Mining:

H. E. T. Haultain, Chairman.

Educational Committee:

E. Marceau, Chairman.
H. Holgate.
L. A. Herdt.
J. M. Shanly.
C. H. McLeod.

Committee on Papers:

H. H. Vaughan, Chairman.

The Officers of Sections and the Chairmen of the several Branches.

The following have been the Committees of the Society during the year:

Nominating Committee for Officers and Members of Council for 1912.

J. M. R Fairbairn, Chairman, representing Dist. No. 1.
H. N. Ruttan, G. A. Mountain, J. Galbraith, } Past Presidents.
E. A. Stone, Representing Dist. No. 2.
A. R. Decary, " " " 3.
James White, " " " 4.
A. C. D. Blanchard, " " " 5.
F. Crossley, " " " 6.
C. E. Cartwright, " " " 7.

Railway Ties:

D. MacPherson, Chairman.
H. D. Lumsden.
F. P. Gutelius.
H. G. Kelley.
Wm. McNab.
J. G. Sullivan.
T. C. Burpee.
H. A. Woods.
A. F. Stewart.
M. H. MacLeod.
W. A. Bowden.
W. B. MacKenzie.

Transportation Routes:

W. F. Tye, John Kennedy } Chairmen.
C. R. Coutlee.
Wm. McNab.
E. D. Lafleur.
F. W. Cowie.
J. A. Jamieson.
M. H. MacLeod.
C. H. Keefer.

Roadbed and Ballasting:

J. G. Sullivan, Chairman
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
T. C. Burpee.
W. B. Mackenzie.
B. B. Kelliher.
H. A. Woods.
M. H. MacLeod.
L. A. Vallee.
R. McColl.

Rail Fastenings and Tie-Plates:

Howard G. Kelley, Chairman.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
J. G. Sullivan.
T. C. Burpee.
A. Stansfield.
B. B. Kelliher.
A. F. Stewart.
L. A. Vallee.
H. A. Woods.
R. McColl.

Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.

Improved Engineering Service:

H. Holgate, Chairman.
A. W. Campbell.
J. A. Jamieson.
F. L. Wanklyn.
G. J. Desbarats.
A. St. Laurent.
L. A. Vallee.
H. J. Lamb.

Establishment of Testing Laboratories:

C. H. Keefer, Chairman.
J. Galbraith.
H. M. Mackay.
J. A. Jamieson.
P. Gillespie.
G. E. Perley.

Usefulness of the Society and Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Sewage Disposal, Etc.:

R. S. Lea, Chairman.
Willis Chipman.
J. S. Dennis.
C. E. W. Dodwell.
John Kennedy.
R. W. Leonard.
C. H. Keefer.
C. R. Coutlee.
E. J. Walsh.
H. N. Ruttan.
C. H. Rust.
T. A. Murray.
W. M. Edwards.

Conservation:

C. R. Coutlee James White	Chairmen.	J. B. Hegan.
H. F. Laurence.		C. E. W. Dodwell.
R. McColl.		A. E. Doucet.
R. O. Sweezey.		R. S. Lea.
J. M. Shanly.		R. W. Leonard.
W. H. Breithaupt.		E. E. Brydone-Jack.
G. A. Bayne.		W. R. W. Parsons.
A. J. MacPherson.		John Chalmers.
J. S. Dennis.		T. H. Tracy.

Good Roads:

A. W. Campbell, Chairman.	W. D. Ballairge.
H. N. Ruttan.	A. F. MacAllum.
R. McColl.	W. A. McLean.
G. G. Powell.	C. E. Cartwright.

Steel Bridge Specifications:

C. N. Monsarrat, Chairman.	N. M. McLeod.
F. P. Shearwood.	H. G. Kelley.
J. G. LeGrand.	W. A. Bowden.
R. F. Uniacke.	P. B. Motley.
H. E. Vautelet.	F. C. McMath.

The Electro-Technical Commission:

L. A. Herdt, Chairman.	L. A. Roseburg.
O. Higman.	J. Kynoch.
H. T. Barnes.	J. Murphy.
L. W. Gill.	A. B. Lambe.
W. A. Duff.	

MEDAL AND PRIZES.

The awards of the Gzowski Medal and of prizes for the best students' papers will be made known during the meeting.

The following is a statement of elections which have taken place since the issue of Bulletin No. 7:

October 14th, 1911.

Members:

Bertram, A.	Green, S. M.
Depencier, H. P.	Hazen, A.

Associate Members:

Adams, A.
Bain, P.
Creer, A. D.
Currie, A.
Frith, A.
Kennedy, T. D.
Munro, G. R.
Rennison, W. G.
Reid, J. R.
Robertson, J. D.
Robinson, T. E.
Sutherland, J. R. S.
Vanaesch, A.
Walker, T. M.
Wilson, L. E.

Associate:

Money, K. E.

Juniors:

Berry, B. C.
Biggs, J. R.
Elliot, G. R.
Harkness, R. B.
Sneath, T. D.
Wickenden, A. A.
Wright, W. W.

Transferred from Associate Member to Member:

Amiot, P. E.
Byers, A. F.
Dodge, G. B.
Fellowes, F. L.
Hoard, C.
Parks, J. H.

Transferred from Student to Associate Member:

Bishop, W. J.
Christie, C. V.
Desy, J. E.
Everall, W. M.
Frame, S. H.
Grant, J. R.
Gransaull, L. R.
Greenlees, A. H.
Heygate, H. J.
Kinghorn, A. A.
MacArthur, F.
Moffat, F. P.
Moon, C. G.
Murdoch, G. G.
Otty, G. N. D.
Smith, R. S.
Trottier, J. P.
Tweedie, A. G.
Williams, V. H.

Transferred from Student to Junior:

Burr, E. G.
Marr, N.
Polyblank, K. G.
Reed-Lewis, E. W.
Ross, R. W.
Saunders, R. G.

Students:

Belanger, J. C.
Bourbonnais, J. A. A.
Bremner, F. E. A.
Briercliffe, H. D. C.
Calder, A.
Dalziel, W.
Duncan, W. E. P.
Elliot, J. A.
Kirk, E. W. H.
Leigh-Mallory, G. E.
MacKay, L. F.
McKinnon, H. W.
Meadows, C. A.
McLerie, A. G.
Morency, G. E.
Ross, C.
Tremblay, J. A.
Stanger, E. A.
Wagner, E. B.
Wermenlinger, E. J.
Zammers, C. F.

9th December, 1911.

Associate Members:

Cate, C. L.
Courtright, M.
Dickison, A. S.
Erikson, A.
Garrow, A. B.
Knight, R. R.
MacKintosh, C. D.
Meadows, J. O.
Melanson, H. W.
Mullon, J. M. L.
Murray, N.
Murray, R. H.
Tuzo, J. A.

Juniors:

Blizard, D. C.
Campbell, W. I. H.
Faus, H. W.
Hamilton, J. R.
Hogarth, G.
Leblanc, P. M. H.
Mackenzie, C. J.
Mungall, A. N.
Murray, W. P.
Sherman, N. C.
Webb, E. E.

Transferred from Associate Member to Member:

Blanchard, A. C. D.
Clement, S. B.
Forward, E. A.
Jenssen, L. N.
Macredie, J. R. C.
Sims, H. B.
Tennant, D. C.

Transferred from Junior to Associate Member:

Hick, H. C.

Transferred from Student to Associate Member:

Amireault, C.
Ashton, A. W.
Bristol, C. F.
Brunner, G. H.
Bunnell, A. E. K.
Cameron, E. G.
Campbell, N. M.
Dingwall, M. S. W.
Drysdale, W. F.
Gzowski, H. N.
Harcourt, R. H.
Huddleston, G.
Johnston, H. S.
McLean, F. A. W.
McKay, F. A.
McKergow, C. M.
Moorehouse, W. N.
Murray, E. W.
Ogilvie, W. M.
Peppard, H. M.
Prefontaine, R.
Read, H. E.
Roberts, A. R.
Smith, D. A.
Van Tuyl, L. G.
Waldron, S. M.
Wilcox, S. C.
Wilson, W. S.
Wolff, M.

Transferred from Student to Junior:

Jenkins, G. A.
Jones, W. H.
Lumsden, H. A.
Spicer, P. O.
Tipper, G. A.
Walker, J. A.

Students:

Bagshaw, F.
Bellhouse, R. W. S.
Brownell, N. W.
DeCardaillac, G. R. E.
Deschenes, A. M.
Downes, A.
Eliasoph, J. E.
Ford, J. W. H.
Gareau, J. R.
Gnaedinger, F. T.
Goorevitch, A.
Hunt, W. H.
Irving, J. C.
Jette, J. C. H.
Lovell, W. E.
Marchbank, O. J.
Montgomery, C. S.
Morton, H. A.
Pearson, C.
Pearson, H. J. C.
Prieur, H. A.
Rosher, J. H.
Somers, N. S.
Staples, G. J.
Starodvoroff, A.
Walley, C. A.

13th January, 1912.

Member:

Field, F. E.

Associate Members:

Iyer, R. P.
Legge, A. H.
Mill, D. W.
Murray, G.
Ouimet, G.

Juniors:

Fredette, J. F.
Lyon, C. D.
Marshall, J. A. P.
Pequegnat, M.
Rutledge, L. T.

Transferred from Associate Member to Member:

Armstrong, C. J.
Gill, L. W.
Scammell, J. K.

Transferred from Junior to Associate Member:

Burr, E. G.

Transferred from Student to Associate Member:

Batho, C.
Beaton, N. H.
Bradt, A.
Carscallen, H. R.
Crerar, S. R.
Fairlie, T. U.
Gillies, G. A.
Kingston, L. B.
Klingner, L. W.
Lawledge, F. M.
McLean, D. L.
Oxley, A. C.
Paris, J.

Transferred from Student to Junior:

Kennedy, W. A.
Morrissette, R.
Sproule, G. St. G.
Schenk, T. M.

Students:

Griesbach, W.
McNeil, H.

GENERAL.

Two volumes of *Transactions* were published during the year, namely, Volume II for 1910, and Volume I for 1911. There has also been published a Bulletin No. 7, giving notes as to elections, etc.; an index of *Transactions*, Vols. I to XXIV, and a revised edition of Specifications for Portland Cement and Standard Methods for Testing.

In accordance with the Society's By-Law No. 27, a ballot was taken as to the term of office of the Vice-Presidents and Members of Council, elected in January, 1911, as follows:

Vice-President for three years J. G. Sullivan.
" " " two " Henry Holgate.
" " " one " C. E. W. Dodwell.

Councillor	for	three	years	P. S. Archibald.
"	"	"	"	E. E. Brydone-Jack.
"	"	"	"	C. R. Coutlee.
"	"	"	"	Phelps Johnson.
"	"	"	"	J. C. Kennedy.
"	"	"	"	P. E. Parent.
"	"	"	"	J. M. Shanly.
"	"	"	"	A. F. Stewart.
"	"	two	"	J. S. Dennis.
"	"	"	"	H. E. T. Haultain.
"	"	"	"	L. A. Herdt.
"	"	"	"	H. M. Jaquays.
"	"	"	"	J. G. LeGrand.
"	"	"	"	R. M. McColl.
"	"	"	"	J. T. Morkill.
"	"	"	"	W. J. Stewart.
"	"	one	"	F. F. Busteed.
"	"	"	"	F. W. W. Doane.
"	"	"	"	A. E. Doucet.
"	"	"	"	C. L. Fellowes.
"	"	"	"	J. A. Hesketh.
"	"	"	"	H. G. Kelley.
"	"	"	"	D. MacPherson.
"	"	"	"	H. H. Vaughan.

The Council at a meeting held on 17th of February last, elected Mr. J. G. Sullivan to the office of Vice-President, thus filling the vacancy arising from the death of Mr. J. E. Schwitzer, and appointed Mr. H. M. Jaquays as Councillor to replace Mr. Sullivan.

In February last a Branch of the Society was formed in Kingston. There are now six branches in active operation.

Under the proposed amendments to By-Laws now before the Society, the educational status of candidates for admission will in future be determined in a more satisfactory manner than has been possible in the past. It is proposed to place the educational work of the Society under the direction of a special Committee, which will set papers and arrange to hold examinations at regular intervals in convenient centres throughout Canada, under the Chairmanship of approved Deputy Examiners.

The Council reports that the Society's house has been placed under option of sale, and that the Annual Meeting will be authorized to confirm the action of the Council and instruct it regarding the acquirement of new quarters.

Two proposals for a summer excursion were submitted to the membership in June last, but the response was not sufficient to warrant carrying out the suggested trips.

The Chairman of the Nominating Committee for Officers and Members of Council has suggested the following procedure for the conduct of the business of the Committees, and the Council has endorsed the same and recommends it to the Annual Meeting for its approval:

"After the election of a Chairman he should obtain from the three Past Presidents on the Nominating Committee the names of several men whom each of them would suggest to fill the offices of President and Vice-President, and from each of the district representatives several names, say four, of men whom each of them would suggest to represent their own districts on the Council. All of these suggested names should then be submitted to the whole Nominating Committee for ballot, so as to cut them down to two names for each vacancy, except the office of President, which should be cut down to one name only. The one thus selected for President, and the two for each of the other vacancies, or such names as might be substituted to replace men who declined nomination would then constitute the slate of the Nominating Committee to stand for election by the Society at large."

Mr. E. L. Corthell desires to call attention of the Society to a meeting of the Permanent International Association of Navigation Congresses, to be held in Philadelphia in 1912, and urges larger membership for Canada. The last meeting of this Commission, at which Canada was represented by the Hon. Mr. Brodeur, was held in Brussels on July 30th.

The following Committees of the Society have presented reports which have been distributed to the membership and will be presented to the annual meeting for consideration: Roadbed and Ballasting; Railroad Ties; Conservation; Good Roads; Testing Laboratories; Educational Requirements; Sewage Disposal; Steel Bridge Specifications; International Electro-Technical Commission.

In view of recent discussions regarding the relations between members of the Society and corporations employing them and of the reported attitude of members towards one another in connection with such incidents, the Council desires to call attention to the Society's code of ethics and asks the co-operation of the membership in maintaining that dignity and decorum befitting a great profession.

C. H. RUST,
President.

C. H. McLEOD,
Secretary.

Montreal, 13*th January*, 1912.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

During the year 1911 the following books have been presented and purchased. The sum of $50 has also been presented for the purchase of books.

By Purchase.

"Annales des Ponts et Chaussées, Paris, France." O. Linen. pp. 313. Plates. Paris, 1883.

"Compressed Air." By Elmo T. Harris. O. Bds., pp. 123. New York, 1910.

"Electric Motors." By F. B. Crocker and Morton Arendt. O. Linen, pp. 291. New York, 1910.

"Electrical Engineering." By Harold H. Simmons. O. Linen, Ill., pp. 920. London, New York, Toronto and Melbourne, 1909.

"Engineering News—Index." 2 vols., 1900-1910. O. Linen. New York.

"The Flow of Water." By Louis Schmeer. O. Linen, pp. 223, New York, 1909.

"Hydraulique." By A. Flamant. O. Linen. pp. 699. Paris, 1909.

"Hydraulique Fluviale." By M. C. Lechalas. O. Linen. pp. 464. Paris, 1884.

"Motor Troubles." By E. B. Raymond. D. Bds., Ill., pp. 197. New York, 1909.

"Navigation Intérieure." By F. B. DeMas. O. Linen, pp. 579. Paris, 1904.

"Rivières à Courant Libre." By F. B. DeMas. O. Linen. pp. 479. Paris, 1899.

"Poor's Manual of Railroads, 1911." 44th Annual Number. O. Cl., pp. 2716. New York, 1911.

"Practical Illumination." By J. R. Cravath and V. R. Lansuigh. O. Bds., Ill., pp 347. New York, 1907.

"Solenoids, Electromagnets and Electromagnetic Windings." By Chas. R. Underhill. O. Bds., pp. 342. London, 1910.

"Steam Electric Power Plants." By Frank Koester. Q. Bds., Ill., pp. 455. London, 1908.

"Theory of Electric Cables and Networks." By Alex. Russell. O. Bds., pp. 269, Ill. London, 1908.

"Three-Phase Transmission Lines." By Wm. Brew. O. Bds., Ill., p. 178. New York and London, 1911.

"The Great Lakes and the Ships that Plough them." By James Oliver Curwood. O. Linen, pp. 227. New York and London, 1909.

"Journal of the Iron and Steel Institute," Subject and Name Index. to vols. LIX-LXXXII, 1901-1910, and to vols. I and II of the

"Carnegie Scholarship Memoirs." Edited by George C. Lloyd. O., pp. 365, and I-CXXXVIII. London and New York, 1911.

Presentations have been made by the following members.

Archibald, C. B., S. Can. Soc. C. E.
Burpee, D. W., M. Can. Soc. C. E.
Callaghan, John, M. Can. Soc. C. E.
Craig, H. B. R., M. Can. Soc. C. E.
Denis, V., A. M. Can. Soc. C. E.
Gilbreth, F. B., M. Can. Soc. C. E.
Hearne, A. R. J., A. M. Can. Soc. C. E.
Lefebvre, H., M. Can. Soc. C. E.
Mackenzie, J. A., A. M. Can. Soc. C. E.
Monroe, H. R., S. Can. Soc. C. E.
Riddall, J. B., A. M. Can. Soc. C. E.
Richardson, W. A., S. Can. Soc. C. E.
Shewen, E. T. P., M. Can. Soc. C. E.

BOOKS PRESENTED.

"American Civil Engineers' Pocket Book." By M. Merriam and D. Lea. Ill. pp. 1,380. New York and London, 1911.
Presented by H. B. R. CRAIG, M. Can. Soc. C. E.

"L'Aeronautique." By C. Paul Renard. D. Linen, pp. 368. Paris, 1909.
Presented by V. DENIS, A. M. Can. Soc. C. E.

"Annual Report of Highway Improvement, Ontario, 1911." O. Bds., pp. 175, Ill. Toronto, 1911.
Presented.

"The Compleat Surveyor: Containing the whole Art of Surveying of Land." By Wm. Leybourn. F. Bds., Illus., pp. 429. London, 1694.
Presented by E. T. P. SHEWEN, M. Can. Soc. C. E.

"Concrete Bridges and Culverts for both Railroads and Highways." By H. G. Tyrrell. Ill., pp. 251. London, 1909.
Presented by J. A. MACKENZIE, A. M. Can. Soc. C. E.

"Les Eaux-de-vie et Liqueurs." By X. Rocques. O. Cloth, Ill., pp. 220. Paris, 1898.
Presented by V. DENIS, A. M. Can. Soc. C. E.

"Economics of Mining." By T. A. Rickard, H. C. Hoover, W. R. Ingalls, R. Gilman Brown and others. Second Edition revised. O. Cl., pp. 380. New York and London, 1907.
Presented by W. A. RICHARDSON, S. Can. Soc. C. E.

"Field System." By Frank B. Gilbreth. D. Bds., pp. 105.
Presented by FRANK B. GILBRETH, M. Can. Soc. C. E.

"Good Engineering Literature." By H. Frost. D. Bds., pp. 422. New York, 1911.
Presented by the AUTHOR.

"Historical and other Papers and Documents Illustrative of the Educational System of Ontario, 1792-1853." By J. T. Hodgins. 3 vols., O. Bds. Toronto, 1911.
Presented by the MINISTER OF EDUCATION FOR ONTARIO.

"Lands; Fisheries and Game; Minerals. Commission of Conservation, Canada." O. Cl., Ill., pp. 520. Ottawa, 1911.
Presented by the COMMISSION OF CONSERVATION.

"The Metallurgic Industry in Italy. Description of some of the principal Works." Associazione fra gli Industriali Metallurgici Italiani, Milan. O. Cl., pp. 430, Illus., Maps, Plates. Milan.
Presented by the IRON AND STEEL INSTITUTE.

"A Pathfinder: Discovery, Invention and Industry. How the world came to have aquadag and oildag; also carborundum, artificial graphite, and other valuable products of the electric furnace." O. Linen, pp. 143. New York, 1910.
Presented by D. W. BURPEE, M. Can. Soc. C. E.

"Report of Advisory Board of Consulting Engineers on the Barge Canal, New York State, 1910." O. Bds., Ill., pp. 410. Albany, 1911.
Presented by the ADVISORY BOARD OF CONSULTING ENGINEERS.

"Report of the Pittsburgh Transportation Problem." By Bion J. Arnold. O. Cl., pp. 202. Pittsburgh, 1910.
Presented by BION J. ARNOLD.

"Sewage Disposal Works." By H. B. Raikes. O. Bds., Ill., pp. 414. New York, 1908.
Presented by J. B. RIDDALL, A. M. Can. Soc. C. E.

"Schools and Colleges of Ontario, 1792-1910." By J. G. Hodgins. O. Bds., Ill., 3 vols. Toronto, 1910.
Presented by the BOARD OF EDUCATION OF ONTARIO.

"Smoley's Tables: Parallel tables of logarithms and squares, angles, and logarithmic functions corresponding to given bevels. Five decimal logarithmic, trigonometric tables, etc., for engineers, architects and students." By Constantine Smoley, C.E. 6th Ed., rev. and enl., D. leather, pp. 174. New York and London, 1911.
Presented by ENGINEERING NEWS PUBLISHING CO.

"Telephone and Telegraph Engineers' Pocket Book." Published by International Correspondence Schools, Scranton, Pa., 1908.
Presented by H. REEVES MONROE, S. Can. Soc. C. E.

"Walls, Bins and Grain Elevators." By Milo S. Ketchum. O. Cl., pp. 556, Illus. New York and London, 1911.
Presented by MCGRAW HILL BOOK CO.

The following is a complete list of periodicals, magazines, transactions, etc., regularly received and on file in the Library:

American Architect, *New York.*
*American Society of Civil Engineers, Transactions and Proceedings, *New York.*
*American Society of Mechanical Engineers, Transactions, *New York.*
*American Society for Testing Materials, *Philadelphia.*
American Institute of Architects, Quarterly Bulletin, *Washington.*
*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*
American Society of Engineering Contractors' Journal, *New York.*
*American Institute of Mining Engineers, Transactions, *Philadelphia.*
American Engineer and R. R. Journal, *New York.*
American Railway Engineering and Maintenance of Way Association, *Chicago.*
American Water Works Association.—Proceedings.
Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico.*
"Antonio Alzate" Scientific Society, Transactions, *Mexico.*
Association of Architects of Ontario, Annual Report, *Toronto.*
Association of Engineering Societies, Journal of, *New York.*
Association of Ontario Land Surveyors, Annual Report, *Toronto.*
Barge Canal, Bulletin, *New York.*
Bibliographie des Sciences et de l'Industrie, *Paris.*
Board of Water Supply of the City of New York, *New York.*
Boletin de Ingenieros, *Mexico.*
Boston Public Library, Bulletin and Annual Report, *Boston.*
Boston Society of Civil Engineers, *Boston.*
Brooklyn Engineers' Club, Proceedings, *Brooklyn.*
Builders' Bulletin, *Montreal.*
Bureau of Standards, Bulletin, *Washington.*
Bureau of Mines, *Washington, D.C.*
Bureau of Mines, Report, *Toronto.*
Canadian Engineer, *Toronto.*
Canadian Electrical Association, *Toronto.*
Canadian Electrical News, *Toronto.*
*Canadian Institute, Transactions, *Toronto.*
Canadian Machinery and Manufacturing News, *Toronto.*
†Canadian Magazine, *Toronto.*
Canadian Manufacturer, *Toronto.*
Canadian Mining Institute, Transactions, *Montreal.*
Canadian Mining Journal, *Montreal* and *Toronto.*

Canadian Municipal Journal, *Montreal.*
Canadian Patent Office Record, *Ottawa.*
Carnegie Library of Pittsburg, *Pittsburg.*
Cassier's Magazine, *New York.*
Cement Record, *Kansas City, Mo.*
"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*
†Century, The, *New York.*
†Chambers' Journal, *London, Eng.*
Cincinnati Public Library, *Cincinnati.*
Cleveland Engineering Society Journal and Transactions, *Cleveland.*
*Cleveland Institute of Engineers, Transactions, *Middlesborough.*
Colorado School of Mines, Bulletin, *Golden, Col.*
Construction, *Toronto.*
Contract Record, *Toronto.*
Cornell Civil Engineer, *Ithaca, N.Y.*
Crerar Library Reports, *Chicago.*
Department of Marine and Fisheries, *Ottawa.*
Department of Mines, *Ottawa.*
Department of Public Works, *Ottawa.*
Department of Railways and Canals, *Ottawa.*
Department of the Interior, *Ottawa.*
Electrical Engineer, *London, Eng.*
Electric Journal, *Pittsburg.*
†Electric Railway Journal, *New York.*
Electrical Review and Western Electrician, *Chicago.*
Electrical Review, *London, Eng.*
Electrical World and Engineer and American Electrician, *New York.*
*Engineers' Club of Philadelphia, Proceedings, *Philadelphia.*
Engineers' Club, *Toronto.*
*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineering Association of the South, Proceedings, *Nashville, Tenn.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*
Engineering-Contracting, *New York.*
*Engineering News, *New York.*
Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*

Engineering Standards Committee Reports, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Canada, Reports of, *Ottawa.*
Geological Survey of Ohio, *Columbus, Ohio.*
Geological Survey of Oklahoma, *Oklahoma.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
Harbour Commissioners' Report, *Montreal.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieurs, *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Magazine, *Cleveland.*
Industrial Engineering, *New York.*
Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*
*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Conciliation, *New York.*
International Waterways Commission, *Ottawa.*
Interstate Commerce Commission, *Washington, D.C.*
†Iron Age, *New York.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumière Electrique, *Paris.*
La Technique Moderne, *Paris, France.*
*Liverpool Engineering Society, Transactions, *Liverpool.*
†London Magazine, *London.*
A Magyar Mernök-es Epitesz-Egylet, *Budapest.*
Machinery, *New York.*
Marine Review, *Cleveland, Ohio.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*
Mines and Minerals, *Scranton.*
*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Motor Car Journal, *London, Eng.*
Municipal Engineering, *Indianapolis.*

New Orleans Sewerage and Water Board, Report, *New Orleans.*
New York Department of Health, *New York.*
North of England Institute of Mining and Mechanical Engineers. *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle.*
Nova Scotia Institute of Science, *Halifax.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
†Power and the Engineer, *New York.*
Providence, City of, Annual Report, *Providence.*
Professional Memoirs, Corps of Engineers, U.S. Army.
Public Health Journal, *Toronto.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*
Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railway Journal of Canada, *Toronto.*
Railway Age Gazette, *Chicago.*
Railway and Marine World, *Toronto.*
Revista Technologico Industrial, *Barcelona.*
Royal Architectural Institute of Canada, Proceedings and Quarterly Bulletin, *Montreal.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng.*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*
Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*
School of Mines, Quarterly, Columbia College, *New York.*
†Scribner's, *New York.*
†Sketch, *London, Eng.*
Smithsonian Institution, Reports, *Washington.*
Société Scientifique Industrielle de Marseilles, *Marseilles.*
Société Industrielle de l'Est, *Nancy, France.*

Société Industrielle du Nord de la France, *Lille, France.*
Société des Ingénieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
The Steamship, *London.*
La Technique Moderne, *Paris.*
Technical Index, *London, Eng.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Army, Corps Engineers—Professional Members, *Washington. D.C.*
U. S. Army—Report, Chief Engineer, *Washington, D.C.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*
Valve World.
Western Australian Institution of Engineers, *Perth, Australia.*
*Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*
Zeitschrift für Architecten u. Ingenieurwesen, *Hanover.*
Zeitschrift des Osterreichischen Ingenieur u. Architekten Vereines, *Vienna.*

University Publications:

Cornell University, President's Report, *Ithaca, N. Y.*
Dalhousie University, Calendar, *Halifax.*
McGill University Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal.*
University of Illinois, Bulletin, *Urbana, Ill.*
University of Toronto, Trans. Engineering Soc., *Toronto.*
University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

The following reprints and publications have also been received during the year:

City Engineer's Report, *Providence*, 1910.
City Engineer's Report, *Toronto*, 1910.
City Engineer's Report, *Winnipeg*, 1910.
Mining and Metallurgical Society of America, Bulletins No. 39 and 40, 1911.
"Multiplex Telephony and Telegraphy by Means of Electric Waves Guided by Wires," by G. O. Squire.
"Nitrification and the Absorption Theory," by F. Wales Stoddard.
Oregon State Board of Health, Rules and Regulations, 1911.
Province of Nova Scotia. Report of Subsidized Railways.
Permanent International Association of Road Congresses Bulletin, *Paris*.
"Studies for Combined Water Front and Terminal Industrial Development"—Dept. of Docks and Ferries—*New York City*.
Bureau of Water, *Albany*.. "Construction of Preliminary Filers." Annual Report, 1910.
Water Commissioners, *Detroit*. Annual Report, 1910.

Accommodation for additional books is practically *nil*. and as a large number of members avail themselves of the privileges of the Library and Reading Rooms this Committee will strongly urge that large and ample library rooms be provided in the new building.

Nelson's Research Bureau has been made use of to a limited extent, but the information received on engineering matters is not what was expected of it.

L. A. HERDT,
Chairman.

January, 13th, 1912.

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1910

Receipts.

Subscriptions :—		
Arrears	$4,031 32	
Current	9,491 20	
Advance	133 60	
Entrance fees	2,124 00	
		$15,780 12
Expense of room to Railway Club		5 00
Interest :		
On Bank balance	97 11	
On Overdue fees	154 58	251 69
Sale of Transactions and Periodicals		42 10
Dividends—		
Can. Per. & West. Can. Mtg. Co. Stock	18 00	
Montreal Light, Heat & Power Co.	14 00	32 00
Total Receipts on Revenue Account		16,110 91
Cash Balance from 1909		4,146 62
		$20,257 53

ERNEST MARCEAU,
Treasurer.

Montreal, January 13th, 1911.

Expenditure.

Transactions and Advance Proofs	$4,226 60	
Printing, Stationery, Binding and Diplomas	2,041 24	
Books, Magazines and Library Expenses	243 23	
Postage, Post Cards, and Telegrams	1,071 74	
Salaries of office staff	3,249 50	
Caretaker's Wages	595 00	
Repairs and House Supplies	137 67	
Property and School Tax	205 15	
Water Rates	38 80	
Electric Light	140 02	
Coal and Wood	116 34	
Gas for Cooking	25 90	
Expenses, Annual Meeting	456 31	
Expenses, Ordinary Meetings	86 90	
Legal Expenses	70 00	
Students' Prizes	50 00	
Insurance	10 00	
Telephone	89 70	
Auditors' Fees	50 00	
Cabs, Cartage, etc	3 00	
Bank Commission	30 35	
Sundry Expenses	36 70	
Messengers and Express	43 84	
Gzowski Medal	8 43	
Branch Societies—Toronto	172 00	
" Quebec	124 00	
" Winnipeg	75 00	
" Ottawa	252 00	
" Vancouver	25 00	
Total Expenditure on Revenue Acct.		$13,674 42
Prize Fund Account		
Over Credited from Detroit Trip 1909		21 35
Cash:—		
Balance in Bank, 31st December 1910	6,545 55	
On hand	16 21	6,561 76
		$20,257 53

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1911

Receipts.

Subscriptions :—			
Arrears	$ 2,092 00		
Current	11,893 25		
Advance	287 75		
Entrance Fees	2,779 00		
		$17,052 00	
Interest :—			
On Bank balance	119 27		
On Overdue Fees	67 28		
		186 55	
Sales of Transactions, Periodicals, and Certificates		133 50	
Dividends:—			
Can. Per. & West. Can. Mtg. Co. Stock	14 40		
Montreal Light, Heat & Power Co. "	16 00		
		30 40	
Rent of Room to Railway Club		10 00	
Total Receipts on Revenue Account		$17,412 45	
Cash Balance from 1910		6,561 76	
		$23,974 21	

ERNEST MARCEAU,
Treasurer,

Montreal, January 13, 1912

Expenditure.

Transactions and Advance Proofs	$2,364 05		
Printing, Stationery, Binding and Diplomas	1,393 27		
Books, Magazines, and Library Expenses	152 14		
Postage, Post Cards, and Telegrams	1,844 48		
Salaries of Office Staff	4,094 30		
Caretaker's Wages	620 00		
Repairs and House Supplies	472 00		
Property and School Tax	203 83		
Water Rates	42 68		
Electric Light	169 49		
Coal and Wood	185 94		
Gas for Cooking	27 80		
Expenses, Annual Meeting	642 92		
Expenses, Ordinary Meetings	234 18		
Legal Expenses	134 60		
Students' Prizes	50 00		
Telephone	40 10		
Auditors' Fees	50 00		
Cabs, Cartage, etc.	17 35		
Bank Commission	43 31		
Sundry Expenses	95 15		
Messengers and Express	29 58		
Gzowski Medal	9 25		
Branch Societies—Toronto	200 00		
" Quebec	50 00		
" Winnipeg	227 00		
" Ottawa	450 00		
" Vancouver	91 00		
Expenses of Committee	100 00		
Total Expenditure on Revenue Acct.		$14,034 42	
Furniture and Permanent Fittings		182 07	
Total Expenditure		$14,216 49	
Balance in Bank, 31st December, 1911	$9,707 07		
" on hand	50 65	9,757 72	
		$23,974 21	

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.
Auditors

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1910

Liabilities			
Surplus at 31st Dec., 1909			$30,598 16
Prize Fund Account at 31st Dec. 1909	490 12		
Less overcredited from Detroit trip in 1909	21 35		468 77
Add Receipts on revenue acct.	$16,110 91		
Less Expenditure	13,674 42		2,436 49
			33,503 42
Less Estimated Decrease in value of Arrears	500 00		
Written off for depreciation— Property acct. 1 per cent		170 00	
Furniture acct. 10 per cent		164 23	834 23
			$32,669 19

Assets			
Property No. 413 Dorchester Street West Balance at 31st December, 1909	$15,833 86		
Less 1 per cent. written off for depreciation	170 00		$15,663 86
Furniture—Balance 31st Dec., 1909	1,642 30		
Less 10 per cent. written off for depreciation	164 23		1,478 07
Books—Estimated value			5,320 00
Arrears of Fees—estimated value			3,280 00
Canada Permanent & Western Canada Morgage Corporation Stock			180 00
Montreal Light, Heat, and Power Co Stock			140 50
Gold Medal			45 00
Cash :—			
In Bank of Montreal, Savings Account	3,311 78		
" " Current Account	3,233 77		
	6,545 55		
On hand	16 21		
			6,561 76
			$32,669 19

ERNEST MARCEAU,
Treasurer,

Montreal, January 13th 1911

Verified
RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

STATEMENT OF ASSETS AND LIABILITIES AT 31st DECEMBER, 1911.

Liabilities.			
Prize Fund Account			$468 77
Surplus			
Balance at 31st December, 1910		$32,200 42	
Add			
Receipts on revenue acct.	$17,412 45		
Less expenditure	14,034 42		
		3,378 03	
Estimated increase in value of arrears		1,720 00	
		$37,298 45	
Less			
Written off for depreciation—			
Property account, 1%	170 00		
Furniture account, 10%	166 01		
		336 01	
			36,962 44
			$37,431 21

ERNEST MARCEAU,
Treasurer,
Montreal, January 13th, 1912.

Assets.			
Property No. 413 Dorchester Street W.			
Balance at 31st December, 1910		$15,663 86	
Less 1 per cent. of cost price written off for depreciation		170 00	
			$15,493 86
Furniture—Balance at 31st Dec., 1910		1,478 07	
Added during year		182 07	
		1,660 14	
Less 10 per cent. written off for depreciation		166 01	
			1,494 13
Books—Estimated value			5,320 00
Arrears of Fees—estimated value			5,000 00
Canada Permanent & Western Canada Mortgage Corporation Stock			180 00
Montreal, Light, Heat, and Power Co. Stock			140 50
Gold Medal			45 00
Cash in Bank—			
Bank of Montreal (Savings Account)		3,411 85	
" " " (Current ")		6,295 22	
		9,707 07	
On hand		50 65	
			9,757 72
			$37,431 21

Verified
RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

The Treasurer can only repeat this year the remark made by him in the last annual report, as to the healthy condition of the Society's finances.

With a fast growing membership, the revenue increases in an appreciable manner, while the cost of management remains practically the same.

In last year's statement, the value of arrears of fees had been put down at $3,280. It stands this year at $5,000, an increase of $1,720.

In this connection it must be stated that our experience in the past has shown that we had, in former years, considerably underestimated the value of this asset.

The negotiations for the sale of the Society's premises, on Dorchester Street, which will be submitted to the Annual Meeting, will show how conservative we have been in keeping the estimated value of this property at some $15,000 or $16,000 for years.

ERNEST MARCEAU,
Treasurer.

Obituaries

CHENARD, JOSEPH R. F., S. Can. Soc. C.E., was born on August 23rd, 1879, at Ste. Helene, Co. Kamouraska, P.Q. He was educated at the College of Ste. Anne, an institution in affiliation with Laval University, and commenced his professional career in 1905 as rodman on the National Transcontinental Railway, subsequently serving as topographer and leveller. In 1907 he was promoted to the position of instrumentman and afterwards had charge of a residency. He died in August, 1911.

CROFTS, JOHN CHARLES THRUSTON, M. Can. Soc. C.E., was born at Newland, Gloucestershire, Eng., 27th Sept., 1861. He received his education at Saarbrücken, Prussia, and at King's College, London. His engineering career was begun in the works of Messrs. Easton and Anderson, Erith, Kent, Eng., and much of his time was devoted to the construction and testing of machinery. In 1883 he was sent to Egypt in charge of the erection of spiral pumps for the Beltim Land and Irrigation Company, Cherbine, Egypt. For several years following, as a member of an engineering firm, he was engaged in the erection and construction of machinery for various companies, and also in general contracting work on roads, bridges, and buildings for the Government, India. With the exception of a year's inspection of machinery of sugar factories in the West Indies, the remainder of his engineering work was carried on in Canada. For four years he was in charge of the erection of aerial wire rope tramways, boilers, mining and saw-mill machinery in British Columbia; three years in Toronto, estimating for the Canada Foundry Company, and in the year 1910, in the Western Engineering Company, Vancouver, B.C. He died suddenly of blood poisoning, at Bedford, England, August 11th, 1911.

Mr. Crofts was a member of the Institute of Mechanical Engineers, England, and an Associate Member of the Institute of Civil Engineers.

FULTZ, GEORGE W., A. M. Can. Soc. C.E., was born at Sackville, N.B., 11th March, 1869, and was educated at Dalhousie College, Halifax. After leaving college he was engaged as rodman on the Halifax and South Western Railway. In 1904 he entered the service of the James Bay Railway Company as rodman, and four years later was promoted to the position of resident engineer. In 1908

he was appointed resident engineer on the Transcontinental Railway, which position he held until the time of his death. He died at Lower Sackville, 11th May, 1911.

Ives, Hubert R., A. Can. Soc. C.E., was born at Plainville, Conn., Sept. 15th, 1833. He was educated in New Haven, Conn., and in 1859 came to Montreal, where he established the firm of Ives and Allan, founders. To-day products from their foundry of fifty years ago are in the homes of hundreds of the older residents of Quebec and other provinces. Business changes followed, and latterly the firm with which his name was connected was best known as H. R. Ives and Company. His death from pneumonia, occurred Sept. 22, 1911.

McDougal, John E., S. Can. Soc. C.E., was born at Toronto, Ont., 9th Aug., 1886. After graduating from the University of Toronto, he entered the City Engineer's Department of Toronto, on survey and construction work. Later he became the engineering and sales representative for the Expanded Metal and Fireproofing Company, Toronto. His death, due to a drowning accident, occurred in May, at Cartierville, Que.

Morgan, William A., S. Can. Soc. C.E., was born at Port Perry, Ont., on May 1st, 1876. He was educated at the Wesley College, Winnipeg, and in May, 1905, he joined the Canadian Northern Railway as rodman on construction, in which company he subsequently served as leveller and instrumentman. At the time of his death he was in the employ of the Monterey W. W. & Sewer Company in Monterey, Mexico. He died in the year 1911.

Poulin, Stanislas Remi, M. Can. Soc. C.E., was born at St. Roch, Que., Dec. 11, 1857. He was educated at Ottawa University. After a year's survey work on the Quebec Graving Dock and Cedar Canal, in the year 1876 he entered the service of the Canadian Pacific Railway, on Government surveys, as leveller, and for upwards of ten years was in charge of location and construction work on the various extensions of that railway. In 1888 he was engaged in the preliminary surveys for a line of railway in Brazil, for which he prepared the plans. Later he was appointed to the position of chief engineer of the Parry Sound Colonization Railway from Elmsdale to Parry Sound. This position he resigned afterwards, in order to complete the line as contractor. In 1897 he became president of the Pembroke Southern Railway, which he built and leased to the Canada Atlantic System. From that time until 1905, when he joined the Transcontinental Railway Commission, he was engaged in the contracting business, and owned a sash and

door factory in the city of Ottawa. In 1906 he was appointed District Engineer, with headquarters at North Bay, and had charge of all the survey work for that district, which he accomplished in an efficient and energetic manner. In 1907 he was appointed District Engineer for a distance of 375 miles east of Winnipeg, and the construction of this difficult section of the road was completed under his supervision.

PRINGLE, THOMAS, M. Can. Soc. C.E., was born at Huntingdon, Que., in 1830. In 1850 he entered business in Montreal as a milling engineer, and for many years he was prominently connected with many of the water power developments and mill building operations throughout Canada. As time went on he became interested in the Montmorency Cotton Mills, and the various mills of the Dominion Cotton Company in Montreal and Magog.

Mr. Pringle's attention was first directed in the sixties to the Lachine Rapids water power possibilities, when he made preliminary plans and a report on the feasibility of the development and pointed out its advantages. Although the matter was carefully considered at the time, no serious move was made. In 1891 he was requested to report a second time on this power in the interest of the Royal Electric Company, and the next year reported on the Chambly water power for the same concern. In the following years the firm, known as T. Pringle and Son, made close observations and accumulated much data, with the result that a number of Montreal capitalists became interested, eventually forming the Lachine Rapids Hydraulic and Land Company, which later passed into the control of the Montreal Light, Heat and Power Company. Owing to ill-health Mr. Pringle retired from business in 1898, but for many years subsequently his services were greatly sought after owing to his sound judgment, and long and practical experience.

WILSON, JAMES, M. Can. Soc. C.E., one of the charter members of the Society, was for some years in the service of the Grand Trunk Railway at Montreal. Later he was appointed superintendent of Queen Victoria Park, under the Niagara Falls Park Commission. His success there attracted the attention of the Toronto City Council, who appointed him Commissioner of Parks for the City of Toronto. He entered upon his duties in Toronto in 1908, and during the three years of his service to that city he rendered most beneficial results. His death occurred in British Columbia, Oct. 29, 1911.

REPORTS OF COMMITTEES, JANUARY, 1912.

Report of the Committee on Roadbed and Ballasting.

The Committee on Roadbed and Ballasting submits the following specifications for the consideration of the Society.

J. G. SULLIVAN,
Chairman.

Winnipeg, November 30th, 1911.

(The specifications presented are to be revised as a result of discussion and will be submitted to the membership for approval.)

Report of the Committee on Ties.

Ottawa, November 28th, 1911.

The Secretary, Canadian Society of Civil Engineers,
Montreal, P.Q.

Dear Sir,

Referring to your request of 25th inst., that the Report of Tie Committee for 1911 be submitted to the Council before December 9th, I attach for the Council's information copies of correspondence I have had in this connection, from which it will appear that only four out of the nine members have taken any part in the discussion, and that two of them are in favour of using ties not longer than 8′ 6″; one sticks to the 8 foot length without, however, advancing any reasons to support his views. Under these circumstances it seems impossible to present anything that could be called a Report of Tie Committee, hence I submit the correspondence for such action as the Council may deem advisable, and in doing so desire to say that this year's discussion, in my opinion, has not disclosed any definite or conclusive reasons to prove that ties shorter than 10 feet meet the requirements of the standard modern track, required to support the immensely increased loads of up-to-date rolling stock.

Perusal of the reports and discussions of the Committee on Ties of the American Railway Engineering Association for several years past will disclose the fact that many members of that association are of the opinion that longer ties are necessary, but that they hesitate to recommend the same definitely for fear of seeming to commit the roads they represent to large increases of expenditure. It would be equally logical to advocate using a 56 lb. rail for the same reason. The chief engineers of the London and Northwestern, and of the Midland Railway, of England, inform me that their standard tie is 9 feet long. These are two of the best maintained roads in the

country, but their engines are probably not more than two-thirds the weight of the heavy engines used on this continent, and the axle loads are lighter in proportion.

Ties 9 feet long have been used in Texas over 30 years with mud ballast, which would indicate that the advantage of increased bearing must more than offset the disadvantages of drainage, even in bad ballast, and these disadvantages would not be so great in gravel ballast.

The chief engineer of the Louisville and Nashville Railway informs me that they have used 10 ft. ties with sand ballast and had no difficulty with drainage, or trouble with ties breaking under the rail. They now use blast furnace slag for ballast in place of the sand, and their standard tie is 9 feet long.

Some ten years ago I had personal experience with a piece of track, about one-half mile long, over muskeg, on the Canadian Pacific Railway, which piece of track was impossible to keep in surface or line with ties 8 ft. long. An experiment was tried with ties 12 ft. long, and that length of tie has been used there ever since with perfectly satisfactory results. The roadmaster recently informed me that he had no trouble with the long ties breaking, and that this summer he had treated another muskeg the same way, with the result that a-half mile of 7 mile section, which with 8′ ties had taken 50% of the time of the section gang to keep in order, had, since the placing of the 12′ ties, scarcely needed any attention, and remained in good surface and line.

These examples would indicate that there is not much danger of 10′ ties breaking, and that they do give the much needed additional support.

I am sending a copy of this letter to each member of the Committee, but do not propose to submit any further formal report.

Yours very truly,
D. MacPHERSON,
Chairman of the Committee on Ties.

CANADIAN PACIFIC RAILWAY COMPANY.

Winnipeg, June 5th, 1911.

D. MacPherson, Esq.,
Assistant Chief Engineer, N. T. R.,
Ottawa.

DEAR SIR,

I have the Secretary's circular letter of May 23rd, notifying members of the Railway Committee of their re-appointment, and asking that we reply to you accepting the same. I will be pleased to serve on this Committee, and do what my spare time will permit.

I also have copy of your letter, May 5th, to the Secretary, regarding an error in the Committee's report. I think, if you will give this matter a little further study, you will find that there was not only an error in figures, but there was also a very serious error in principles. Leaving aside all the features that make it unnecessary to tamp under the centre of the ties, and assuming that it would be good railroading to so tamp ties, (which, of course, I do not admit), the only place a tie is apt to break is under the rail or at the centre. Now, if you will figure up the strain, putting the moment at the centre of the tie equal to the moment underneath the rail, I think you will soon discover the error I allude to.

To make the case a little more clear. Imagine the tie turned upside down, the rails a support, and the tie carrying a uniform load. I think you will find that theoretically the length of tie for a safe load is considerably less than 9 ft.

Yours truly,

J. G. SULLIVAN.

To the Members of the Committee on Ties, Canadian Society of Civil Engineers.

As the Committee on Ties has been continued from last year, with the understanding that only those who expressed a willingness to act need be considered as members, I would advise you that the men whose names appear on this letter have stated their readiness to act, which should assure a good live report for next Annual Meeting. Unless the majority of the members of the Committee wish otherwise, it might be well to confine our work this year entirely to determining what, in our opinion, are the best dimensions for ties for a standard trunk line railway, and not go into tie preservation or cost at all.

Of course the question of cost is very vital, but the first and most important things to determine are the proper dimensions to give the best results.

I enclose copy of some correspondence between one member of the Committee and myself, which may help to set the ball rolling, and I would ask each member to contribute something definite on the subject as early as possible, avoiding generalities and giving logical reasons for all theories advanced. As soon as all the members contribute something on the subject, I shall call a Committee meeting, when we can exchange views more fully and perhaps evolve matter for further inquiry or discussion.

In the meantime, I hope you will pitch into the two of us who have so far committed ourselves to paper and handle our theories

without gloves, so long as you evolve something better or advance arguments which prove our points of view to be erroneous.

COMMITTEE.

E. P. Gutelius.
H. G. Kelley.
Wm. McNab.
J. G. Sullivan.
T. C. Burpee.
H. A. Woods.
M. H. MacLeod.
W. A. Bowden.
W. B. MacKenzie.

D. MACPHERSON,
Chairman.

July, 1911.

July 20th, 1911.

J. G. Sullivan, Esq.,
Assistant Chief Engineer, C. P. R.,
Winnipeg, Man.

DEAR SULLIVAN,

I am obliged for yours of the 5th ult., *re* ties, and, if all members of the Committee, in addition to the interest they take in this matter, would show that interest as practically as you are doing, we should soon thresh out some useful information. We must, however, each be careful to try to look at the matter, not only from our own, but from the other fellow's point of view. I am quite willing to admit the words "firmly tamped for its entire length" may be misleading. It would be better to say tamped for its entire length in such a way as to give, as nearly as possible, uniform support, having regard to the distribution of the load, that is, tamped hard under the rail and for a distance of say 18 inches each way, from edge of rail base, and outer ends tamped more firmly than at centre of track. I have not entirely overlooked the principles of the bending moment you refer to, and agree with you that the moment is greater under the rail for a 10′ tie than for an 8′ tie, but it is less at the centre for the longer tie. Ties are more apt to break at the centre than under the rail, when frost is coming out, and that is about the only place and time good ties ever break, therefore, the lessening of the moment at centre should be an improvement. I have used 10 ft. and 12 ft. ties, with excellent results, over bogs and places where track could not be kept in surface or line with 8 ft. ties, and have never known a long tie to break under such circumstances. Does not this indicate that the bending moments in the tie may not be as important as providing an increased area of foundation for the immensely increased weights of recent years. Your illustration of turning the tie upside down, supported on the rails, and assuming load uniformly distributed, certainly facilitates calculation of the

stresses, but unfortunately we know the load is not uniformly distributed, hence calculations based on that assumption are inconclusive. In any case, they only refer to the strength of the tie and not to its effectiveness in providing, as nearly as as possible uniform minimum unit pressures on the ballast. I will in turn make a suggestion to illustrate my point of view. Assume that the ties are sawn straight through in the centre and the spreading of the track taken care of by steel the rods bolted to the rails. Would not the outer ends of 8 ft. ties be immediately crushed into the ballast and the inner ends be cocked up? Would this happen if ties were of equal length each side of rail, and if not, does it not prove that lengthening the ties is not altogether folly?

I shall be glad to hear further from you on the whole question, and hope you will raise as many points as possible.

Yours truly,

D. MACPHERSON.

GRAND TRUNK RAILWAY SYSTEM.

Office of the Chief Engineer,

Mr. D. MacPherson, July 31st, 1911.

Chairman Tie Committee,

Canadian Society of Civil Engineers.

DEAR SIR,

I have read with interest the letter from Mr. J. G. Sullivan, under date of July 20th, addressed to you upon the subject of ties, and your circular letter to the Committee.

The matter seems to have been well studied from a mathematical point of view, yet without reaching a unanimous conclusion.

I intend, therefore, in this letter to discuss it purely from practical conclusions derived from experience and observation.

Upon first class rock ballasted track with embankments and ballast, old and well settled, there is but little trouble with ties breaking.

Upon good gravel track, well maintained, the breakage under the rail is more frequent than breakage in the centre of the track, except in the case of centre bound track.

Upon unballasted or earth surfaces track, the breakage is about evenly divided; if there is any difference, I believe the breakage under the rail is in excess.

In the above three cases, I am considering track laid with the ordinary sized tie, 6″ x 8″ x 8′ long.

Would not the above indicate that so far as strength is concerned, the extension of an 8′ tie beyond the rail is already as long as it should be to balance the stress upon the middle of the tie?

Upon all track, the primary object to be attained is drainage, and any type of construction which retards the drainage, injures the track and places a greater physical stress upon the ties.

In the Southern States of the United States many years ago, where ballast was scarce, rains plenty and track bad, a road running from Memphis, Tenn., to Little Rock, Ark., tried the experiment of using ties 9′ long. After a few years their use was abandoned as being a detriment to the track on account of the retarding of the drainage, and the company returned to the use of ties 8′ long.

Other roads in the northern parts of the United States have used 9′ ties, but so far as I know, their use has been discontinued, and only in some instances have the roads adopted as their standard ties 8′ 6″ in length.

In view of the above facts, I believe that the maximum length of the tie should not exceed 8′ 6″, and that a tie 8′ long will answer all purposes for modern traffic, and enable the maintenance departments of railroads to maintain first class track. I believe, however, that ties 6″ thick are not sufficiently strong, and that ties for main line traffic should be 7″ thick by at least 8″ wide, but that in no case should they be more than 10″ wide.

Yours truly,

H. G. KELLEY.

Montreal, Que., August 9th, 1911.

Mr. D. MacPherson,
Chairman of Tie Committee, Canadian Society of Civil Engineers.
Ottawa, Ont.

Dear Sir,

In your circular letter to the Committee on Ties, you suggest that the Committee confine the work of this year entirely in the effort to determine what, in its opinion, are the best dimensions for ties for standard trunk line railway.

I think the Committee will agree that the ordinary tie, 6″ x 8″ x 8′ in length, with, as generally spaced, 22″ centres, does not give sufficient bearing for the rolling stock now in use.

To add to this bearing surface, shall we increase the length of the tie, as suggested in your report to the Society last season, or adopt some other conclusions?

Evidently, there is a diversity of opinion as to the actual theoretical length of a tie for a safe load, and there will doubtless be a further discussion on that subject.

Personally, I think the increased length suggested is hardly justified by past experience. Several railways in the United States at one time called for ties 9′ in length, but I do not know of any using that length at the present time. The Pennsylvania Railway and the New York Central, with some of its allied lines, are calling for ties 7″ x 7″ x 8′ 6″ in length. Would not this indicate, in a measure at least, that ties even 9′ in length were undesirable, either on account of additional cost, or difficulty in procuring them.

In my opinion a 10′ tie, aside from the difficulty in procuring it, and the additional cost, (which would be almost prohibitive), has other disadvantages, among which are increased breakage over the shorter tie, retarded drainage and additional ballast required.

Personally, I believe that ties should not be less than 7″ in thickness, 8″ on face, and 8′ or 8′ 6″ in length; that they should be laid with 20″ centres, 20 to a 33′ rail length.

Ties are so spaced on several railways at the present time. With this number of ties of the dimensions named, and with proper ballast, I believe that first class track can be maintained.

Very truly yours,

H. A. WOODS.

CANADIAN PACIFIC RAILWAY COMPANY.

Montreal, October 7th, 1911.

D. MacPherson, Esq.,
Assistant Chief Engineer, N. T. Ry.,
Ottawa.

DEAR SIR,

Replying to your circular letter of October 2nd, to the Tie Committee of the Canadian Society of Civil Engineers.

I regret that I will not be able to attend the meeting on the 14th instant. I desire, however, to put myself on record as being opposed to making ties more than 8 ft. in length.

Yours truly,
F. P. GUTELIUS.

REPORT OF THE COMMITTEE ON CONSERVATION.

As the undersigned was only appointed Chairman of this Committee in November last, it was not possible in the few weeks intervening between the appointment and the submission of this report to Council, to initiate any Conservation work. In default of a report

on work done by the Committee, a statement of Conservation work now being carried on by the Commission of Conservation is appended. This, it is believed, will be of interest to the members of the Society, and will also, to a certain extent, indicate the lines along which it is desirable that engineers should co-operate with the Commission of Conservation.

The Commission of Conservation has been organized into seven committees and the work it has done can best be outlined under the heads of these committees. The committees deal with Waters and Water-Powers, Minerals, Forests, Fisheries and Game, Lands, Public Health, and Press and Co-operating Organizations.

The recently issued report on the water powers of Canada is evidence of the wide range of the activities of the Committee on Waters and Water Powers. It includes the results of all previous investigations on this subject in addition to the data obtained by the engineers of the Commission during the past two years. The laws governing the disposal of water powers are summarized, descriptions of many of the larger developments are given, and physical data given for every power in Canada upon which information was available. The report is illustrated and is accompanied by a series of reference maps in which all the powers mentioned in the statistical tables are indicated by reference numbers.

In 1910, circulars requesting information respecting water powers were sent to each member of the Society, and much information was thus obtained. Copies of the report have been sent to each member and associate member resident in Canada, and, later, will be sent to the junior members and students. All recipients of the report are earnestly requested to send addressed "Secretary, Commission of Conservation, Ottawa," any additional information that they have or may procure, particularly as regards the flow of streams, height of fall, etc.

In preparing this report, the data on the powers of Western Canada were found to be so meagre that the Committee decided to make a special survey of the water powers of those provinces. The engineers of the Commission have been working on this during the past summer and it is hoped that the work will be sufficiently advanced to allow of a report on it being published next year.

The results of the work done by the Committee on Minerals are also embodied in a report published in 1911. It contains a summary of the mining laws of the Dominion and of the various provinces. An exhaustive article on the mineral resources of Canada describes the extent and nature of the most important mineral deposits and suggests measures for lessening the wastes now incident to their exploitation. Another article treats of the subjects of mine accidents in Canada and foreign countries.

During the past summer the mining engineer of the Commission visited the producing coal mines of the Western Provinces and a report on the conditions obtaining in these will be issued shortly.

The Committee having charge of the Forestry work of the Commission has concentrated its attention on the prevention of forest fires. In 1910 an investigation was made into the causes of forest fires, and it was found that in that year about 34 per cent. of those for which a cause could be assigned and 25 per cent. of all fires in British Columbia, were set by railways. Representations were made to the Dominion Government with a view to securing legislation and, in the last session of Parliament, the Railway Act was amended so that the Railway Commission may compel the railways to maintain an efficient and properly equipped fire patrol. The railways were also made liable for damages caused by sparks from their locomotives, whether it was proved that they had been negligent or not; but such liability for damages was not to exceed $5,000 if modern and efficient fire prevention appliances were used. The Committee on Forests has also taken an active part in furthering the reservation of suitable territory for forest reserves. In 1910, it recommended the setting aside of the eastern slope of the Rocky Mountains as a reserve. This was done by an Act passed by the late Parliament.

The Committee on Fisheries and Game is likewise gathering together facts as a basis for future investigations. The results of the work for 1911 have been published in the form of a report. This contains a digest of the clauses of the British North America Act relating to the jurisdiction of the Dominion and the Provinces in the matter of fisheries, a summary of all the Dominion and Provincial laws respecting fisheries, an article on the North Atlantic fisheries dispute recently terminated by the decision of the Hague Tribunal, and an article on the Canadian oyster industry which, on account of the long standing jurisdictional dispute between the Dominion and the Provinces, is in danger of extinction. The report also contains articles on the fish and game resources of the various Provinces and a statement of the Dominion and Provincial revenues received from these resources. Tables are given showing the fish production of Canada and each of the Provinces as far back as figures are available. The amounts given in these tables have, with a great deal of labour, been compiled in terms of *weight* instead of *value*, in order that the actual state of the fish supply would not be disguised.

During the past year the Committee on Lands has continued the work begun in 1910, of ascertaining the condition of agriculture in Canada. In this work the Committee had the benefit of the assistance of the Agricultural Colleges and the Provincial Departments of Agriculture. In each province, a hundred representative farms

were selected and a census of these was taken by specially instructed men in order to find out what state of efficiency farming operations had reached. Some of the more important topics on which information was obtained were crop rotation, the prevalence of weeds and insect pests, the use of fertilizers and the sanitary conditions of the farm home. The results of this inquiry are being condensed and tabulated. This work is in the nature of a diagnosis of the condition of agriculture and will furnish data that will largely determine the direction that the future work of the Committee will take.

In addition to this the Committee on Lands is conducting experiments with alfalfa growing in several districts of Quebec in order to determine under what conditions and in what localities of the Province this important forage crop can be most advantageously grown. These experiments are being made under the supervision of Prof. L. S. Klinck, of Macdonald College.

The Public Health Committee has dealt with a variety of subjects during the year. Early in 1911, the epidemic of typhoid in Ottawa was investigated. The cause of the outbreak was traced to the water supply, which had been contaminated by sewage that had entered the mains when an emergency valve in the intake pipe had been opened to increase the pressure during fires. Special attention is now being given to the subject of slums and city planning by the Medical Adviser of the Committee, who visited Europe last summer in order to learn the latest developments in connection with these subjects. In addition to this, infantile paralysis, a disease new to Canada, is being investigated. As a result of the meeting of Dominion and Provincial Health Officers called by the Commission in Ottawa last year, the Government approved of the establishment of a national laboratory and the creation of a permanent Central Council of Health to advise Governments and Municipalities on public health matters. This conference of Dominion and Provincial Health Officers submitted to the Government the draft of a bill designed to prevent the pollution of waterways by sewage. A bill on this subject introduced into the Senate by Senator Belcourt embodies some of the points recommended by the Conference.

Though possibly not connected with the conservation of natural resources as generally understood, the writer has commenced the compilation of a second edition of the "Altitudes in Canada," believing that its publication will conserve the financial resources of capitalists, railway companies, etc., who propose to develop our resources. A work of this nature is of material assistance to engineers when making preliminary reports respecting the feasibility of railways in certain areas, the probability of securing certain grades, etc. Mr. G. H. Ferguson is now employed on this work and

it is hoped that it will be printed next summer. All members of the Society who have additional information respecting altitudes are requested to forward it to the writer. Requests have already been sent to the various railway companies and have met with hearty responses that are extremely gratifying as evidencing an appreciation of the value of the work.

Another matter to which the Commission is devoting attention is the destruction of property by fire. The annual fire waste in Canada is extremely large, being, as a matter of fact, from seven to ten times as large as it is in the large European countries. The investigation being conducted will endeavour to point out the chief causes of this large loss and suggest means whereby it may be lessened.

The Committee on Press and Co-operating Organizations has charge of the publicity work of the Commission. This is done through the press, the publication, in suitable form, of the reports of the Commission, and also by means of the public platform. The aim is to issue the publications in an attractive and substantial form, and, by means of a large and well classified distributing system, to place them where they will be most effective.

JAMES WHITE,

Ottawa, December 7th, 1911. *Chairman.*

Report of the Good Roads Committee.

Letter to Members of Committee.

As Chairman of the Committee appointed to consider the question of good roads and street construction and maintenance, and to draw up a standard of classification and specification of good roads in Canada, I beg to say that owing to the different members of this Committee being so widely separated, the Committee has not had an opportunity of jointly conferring on this subject, except by correspondence. You will note from the correspondence, which I submit herewith, that the majority of the opinions received from the different members of the Committee is that it would be very difficult to prepare a standard specification which would meet the requirements of all sections of the country, with the varying conditions, climate, soil, traffic and available material. At the same time your Committee is of the opinion that a draft specification such as the

attached, embodying the principle of broken stone construction to meet the average requirements, would be of very great service and assistance to many engaged in this particular line of work, and would suggest, at least, the best practice resulting from our experiences up to the present time.

Ottawa, Nov. 9th, 1911. A. W. CAMPBELL,
Chairman.

(The specifications presented are to be revised as a result of discussion and will be submitted to the membership for approval.)

REPORT OF COMMITTEE ON THE ESTABLISHMENT OF TESTING LABORATORIES.

Ottawa, November 2nd, 1911.

The Secretary,
Canadian Society Civil Engineers,
Montreal.

Dear Sir:

For the information of Council I beg to submit on behalf of the members of our committee, Professors J. Galbraith, Past President, Peter Gillespie, H. M. Mackay, and Messrs. A. St. Laurent, Geo. E. Perley, J. A. Jamieson, Phelps Johnson and myself, the following report of the Committee on Establishment of Testing Laboratories.

On my return to Canada in September, after an absence of six months, I consulted the two Ottawa members of our committee, Messrs. A. St. Laurent and Geo. E. Perley, and found that as the result of our previous efforts the Minister of Public Works, the Hon. William Pugsley, had fulfilled his promise, as expressed in his letter of November 14th, 1910, and recognized the "importance of this matter," and in answer to our suggestions sent an officer of his Department, Mr. Geo. E. Perley (a member of our committee), with Mr. Arthur Surveyor, to obtain information as to existing American Government Laboratories. The result of their examinations is embodied in a report with which Mr. A. St. Laurent (also a member of our committee), has kindly furnished us with a copy, enclosed herewith.

In answer to a circular letter, a copy of which I enclose, dated October 4th, 1911, sent to the members of the committee, I find that we are of the general opinion, that owing to the late change of Government and administration of Public Works Department, nothing further can for the present be accomplished by our Committee. A suggestion has been made by members of our committee

that we might lay before the present Minister, at the proper time, a statement of the facilities for testing materials already in Canada. Also that the object which the Society has in view would be best accomplished by co-operation between the existing Testing Laboratories and whatever Government Testing Laboratories may be established to secure greater economy and avoid unnecessary duplication of equipment.

Yours etc.,
C. H. KEEFER,
Chairman, Committee on
Testing Laboratories.

Ottawa, Ont.,
November 29th, 1911.

The Secretary, Canadian Society Civil Engineers,
Montreal, P.Q.

DEAR SIR,

I received your letter of the 11th inst. *re* report of Committee on "Establishment of Testing Laboratories," acknowledging receipt of our report, and instructing me, on behalf of Council, to call on the Hon. Mr. Monk, Minister of Public Works.

I arranged to secure a necessarily brief interview with the Minister this afternoon, as he is very busy, he however expressed generally sympathy with the movement, and asked me to see him later when he would have more time to discuss the matter.

Yours very truly,
C. H. KEEFER,
Chairman.

Office of the Assistant Deputy Minister,
Ottawa, September 29th, 1911.

DEAR SIR,

I beg to enclose herewith for your information and that of the Committee on the Testing of Materials two copies of the report of Messrs. Geo. E. Perley and Arthur Surveyer in connection with the proposed establishment by the Government of a General Testing Laboratory.

Yours very truly,
A. ST. LAURENT,
Assistant Deputy Minister.

C. H. Keefer, Esq.,
Civil Engineer,
Metropolitan Building,
Ottawa.

Report on the Initial and Maintenance Cost of a Laboratory for Testing Materials.

We want to state at the very beginning that we found it very difficult to arrive at the cost of a fully equipped laboratory, as the Directors of the different laboratories were loath to give the prices, and the manufacturers refused to mark prices in their catalogues and insisted on having a full list of the machinery required before giving out any quotation.

Not knowing how much money the Government would be willing to spend, we have made out a list including the machinery for the testing of building materials, and also the machinery for the testing of road materials. Since the recent development in reinforced concrete, construction wire has been used extensively both as mesh for floor fabric and as spiral wound columns, so that we have thought advisable to include the wire testing machines.

In order to justify our list, we give below some of the resolutions of the Conventions held at Munich, Dresden, Berlin and Vienna, for the purpose of adopting uniform methods for testing construction materials with regard to their mechanical properties.

1. *Tests of wrought iron, mild steel, steel, cast iron, copper and alloys.*
   - Tension tests (wrought iron, mild steel, steel, cast iron, copper and alloys).
   - Transverse tests (wrought iron, mild steel, steel, alloys).
   - Bending hot and cold (wrought iron, mild steel, steel, copper and alloys).
   - Compression tests (cast iron, alloys).
   - Impact tests for brittleness (wrought iron, mild steel).
   - Penetration tests (wrought iron, mild steel, steel).

II. *Tests of wire (steel and copper).*

- Tensile tests.
- Torsion tests.
- Repeated bending tests.
- Twisting tests.

III. *Tests of Wood.*

- Compression tests.
- Transverse tests.

IV. *Tests of Building Stone (Natural and Artificial).*

Compression tests.
Tensile tests.
Transverse tests.
Specific gravity.
Resistance to frost.
Resistance to fire.
Porosity.
Abrasion tests.
Chemical analysis.

V. *Tests of Paving and Ballast Material (Natural and Artificial).*

Determination of French co-efficient of wearing.
Compression tests.
Abrasion tests.
Resistance to frost.
Cementation tests.
Hardness tests.
Chemical analysis.

The nucleus of all testing laboratories, with the exception of the laboratory of the U. S. Bureau of Standards at Washington, seems to be several universal testing machines ranging in capacity from 100,000 pounds to 600,000 pounds.

The U. S. Bureau of Standards in Washington is in charge of Col. J. E. Howard, of the U. S. Army, who has been identified with the experiments made in the last 20 years at the U. S. Arsenal at Washington, Mass.

The Colonel showed us the blue prints of two testing machines (similar in design to the Waterton machines), which are made by A. H. Emery, of Stanford, Conn. Both the machines are horizontal and have the following capacity: Machine No. 1 will develop 230,000 pounds in tension or compression, will test pieces 30 inches long, and cost $10,000.

Machine No. 2 will develop 2,300,000 pounds in compression, 1,150,000 pounds in tension, will test pieces 30 feet long, and cost $150,000.

We consider, however, that besides being too expensive, these horizontal machines will not give as accurate results as the vertical machines in the testing of beams and columns. When we expressed the opinion that in practice, pieces working in compression were not generally horizontal, the Colonel gave us the example of the top chord of a Pratt Bridge and added that anyhow, the pieces could be supported. This example, however, is the only exception, and applies to steel pieces only, whilst the most interesting researches

nowadays are made on reinforced concrete, and to support pieces sufficiently to annul the bending moment would introduce a coefficient of friction which would certainly alter the results.

The vertical universal testing machine as manufactured by Olsen and Riehlé, of Philadelphia, can make tensile, compression, and transverse tests of either beams or columns, steel rods or steel cables, and is not very expensive.

The Department has already a vertical universal testing machine of 150,000 pounds capacity, made by Riehlé Bros., of Philadelphia, but we consider that a more powerful machine should be bought, especially if there is room enough for the testing of columns.

One vertical universal testing machine, electrically driven, of 400,000 pounds capacity (for columns and beams), length 12 ft., height 11 ft., breadth 5 ft. 4in., weight 23,000 lbs.	$4,500
4 Johnson's Extensometers for measuring extension or compression in concrete beams, columns and structural members	300
One Ewing Extensometer, for use with standard 8" small diameter specimens	150
One Berry Extensometer	150
One travelling crane (for beams)	1,000
One steel carriage for raising and moving concrete beams	200
Moulds for beams, cylinders, and cubes	250
One overhead traveller	250
One compound generator 25 K.W., capacity 125 volts	500
Small gauges, punches, hammers, micrometers, per cent. gauges, deflectormeters, compressometers, inclinometers, etc.	1,000
One Ransome Mixer, 4 cubic feet capacity, belt driven with hopper on skids	320
Gripping wedges and specimen holders	100
One five horse power motor	300
One void apparatus	100
One furnace, blower, pyrometer, for testing resistivity of material to fire	400
One Brunswick freezing machine capable of giving temperature of —10°	400
One repeated stress machine for testing endurance of steel and other metals under repeated alternate stresses of tension and compression, for testing shafts, etc.	700
One cold bending testing machine	300

One encased abrasion cylinder for building stone	400
One rotating grinder for building stone	400

MACHINERY REQUIRED FOR WIRE TESTING.

One wire torsion testing machine	200
One wire twisting testing machine	200
One direct motor driven vertical wire tester; capacity 10,000 lbs., length 4 ft. 6 in. height, 5 ft., breadth 2 ft. 6 in., W. 825, 2 wire extensometer	700 80

MACHINERY REQUIRED FOR THE TESTING OF ROAD MATERIAL.

One standard abrasion cylinder, designed by L. W. Page	600
Two impact testing machines, as designed by L. W. Page	1,000
One Ball Mill	500
	$15,000

To this should be added about $7,000 for duty, transportation and erection, bringing the total required for the equipment of the physical testing laboratory to $22,000.

The present chemical laboratory would need an additional expenditure of say $3,000, bringing the grand total to $25,000.

During our visit we did not see any arrangement for the testing of reinforced concrete slabs, yet, in no other branch of reinforced concrete construction is there so much disagreement between the different designs. As a proof of this assertion we give below a table taken from an article published some months ago by Louis F. Brayton in the *Engineering News*, giving the weight of steel required in a panel 20 ft. by 20 ft., supporting a live load of 200 lbs. per square foot, calculated by different methods. The working stress of the steel is taken in every case as 16,000 pounds per square inch.

	Thickness of slab.	Pounds of steel in rail.
1 Cantilever	8 inch.	2,189
2 Turneaure and Maurer	12 "	1,391
3 Grashof	8 "	784
4 Mensch	8 "	2,120
5 Turner	8 "	545
6 McMillan	8 "	1,084
7 Brayton	8½ "	1,900

This table indicates a variation of about 400% between the lowest and highest amount of steel under the various methods of computation, and it stands to reason that both extreme methods cannot be right.

If the Cantilever method is best, we stand a chance of seeing the slabs designed under the other methods break down at any moment, and if the Turner is right in its supposition there is an awful quantity of steel being wasted; in any case it is bad engineering practice, and since the theory pure and simple has failed to give a satisfactory analysis of the stresses developed in the slabs, it is time for the laboratory-trained observer to measure accurately the deformation of the slabs under various loads and by the simple transformation of these deformations into stresses to give new basis for future designs.

In a paper read before the National Association of Cement Users, Mr. Arthur Lord, research Fellow in the Engineering Experiment Station of the University of Illinois, describes a test of a flat slab floor in a reinforced concrete building now under construction at Minneapolis, Minn. This test gave valuable information which could not probably have been secured in a laboratory except at a very large expense, but on the other hand the author recognizes the disadvantages arising from the fact that the test could not be carried to destruction. It would seem from the above that the two methods of experimenting will be required before the Engineering profession at large can adopt a fairly uniform method of designing reinforced slabs.

These tests could be made easily in a large room 12 ft. or 14 ft. high, so as to allow one man to stand under the slab to observe the deformation and another to stand over the slab and regulate the loading. This loading could be done by a travelling crane and the load consist of bricks or cement bags or any other easily handled weight.

Cost of Maintenance.

To the present staff of the Cement Testing Laboratory should be added two new assistants. One of these should be well up in chemical analysis and both should be graduates of a recognized school of engineering.

In the Public Roads Bureau at Washington the candidates must be graduates of recognized schools of engineering and are also compelled to pass a stiff examination. In the U. S. Bureau of Standards they are only obliged to pass an examination, but Col. Howard told us that he did not think it possible for a candidate to pass that examination without having attended a school of engineering.

We do not believe that an examination would be necessary unless there were very many candidates, but we think it absolutely necessary that no application should be considered unless the applicant is the holder of a degree from a recognized Canadian Engineering School.

In order to form an estimate of the cost of maintenance of such a laboratory, we give herein the annual report of the Waterton Arsenal for the year 1906.

Number of specimens tested during the year:	
Gun specimens	50
For Ordnance Department	1,531
For other Government Departments	180
Investigate tests	514
Tests for private parties	951
Total	3,226

The receipts and expenditures were as follows:	
Amount appropriated for testing machine and testing work	$15,000.00
Received from private parties	1,087.11
Total received	$16,087.11
Amount expended for services and labour	$11,197.35
Amount expended for light, power, tools, implements and material for tests	4,889.67
Deposited to credit, Treasurer of United States	.09
Total	$16,087.11

It will be seen from the above that the returns from the tests made for private parties alone probably would not pay, at least in Ottawa, for the maintenance of the Laboratory. The simpler tests of steel bars and cements would in all probability be handled by the private testing laboratories in Montreal, and this would leave for the Government Laboratory the largest steel members turned out by the bridge company and the investigation on road material for the different municipalities.

Of course, to these should be added the tests on materials used by the Public Works and by the other Departments which would have to be made by the private laboratories if the Department did not have such a laboratory.

The cost of these tests would mount up very rapidly, as the private laboratories would have to buy special machinery in order to test the complicated pieces (especially if the Naval Department

begins to build ships) used only in Government construction, and would charge accordingly.

Another very valuable return for the money expended to equip a laboratory would come from the discoveries which might result from the investigations and which would benefit the country at large. We consider, for instance, that the recent discovery made by Mr. L. W. Page, of the U. S. Public Roads Bureau, on the possibility of making impermeable concrete by simply adding a certain quantity (10% to 15% of the weight of the cement) of heavy non-volatile oil to the mixture, has amply repaid the U. S. Government for the money expended in the up-keep of this Laboratory.

(Signed) GEO. E. PERLEY,
Engineer-in-Charge.

(Signed) ARTHUR SURVEYER,
Supervising Engineer.

On the Advisability of Having Laboratories to Determine Effects of Sea Water on Concrete.

As stated in our letter, we had in New York a long interview with Mr. Rudolph F. Wig, Engineer in Charge of the U. S. Geological Survey Experimental Station at Atlantic City, and we have given here a summary of the information we gathered from his conversation.

They have been experimenting at the Atlantic City Station on briquettes and blocks of different compositions, neat cement, cement mortars, concrete, etc., and have also tried mixing with fresh and with salt water and various methods of depositing concrete in sea water. The experiments have not lasted long enough to give very conclusive evidence, but the principal points made out by Mr. Wig were the following: that concrete mixed with salt water is no good; that concrete mixed with fresh water and well protected, whilst being deposited, is satisfactory; that the frost should be feared more than the chemical action of sea water, and lastly, that the briquettes of neat cement exposed to sea water are no good.

This last remark surprised us. So we asked Mr. Wig if he had noticed in his tests of concrete blocks exposed to sea water that the leaner mixtures stood the compression tests better than the richer mixtures? He replied that this was not the case, and that the variations in the ultimate strength of concrete for the various mixtures were about the same as for ordinary concrete not immersed in sea water. So there is evidently room here for a thorough investigation.

This weakness of neat cement briquettes immersed in sea water mentioned by Mr. F. Wig has also been noticed by Mr. J. M. O'Hara, Engineer in Charge of the Southern Pacific Laboratory, San Francisco, Ca., and we have thought it useful to quote from his article published last spring in the *Engineering Record.*

"In a series of tests made by the writer to select a cement for "use in a sea water construction, certain suggestive facts were "developed which seem to possess considerable interest. During "the investigation three classes of failure were met with: swelling "and bursting of the test pieces in the early stages of hardening; "gradual loss of strength in the test pieces by sea water permeating "and rotting the cement; softening of the test pieces and gradual "falling away. Briquettes were made for physical tests with several "brands of cement (Portland) and after 24 hours in moist air one "set was submerged in fresh water, and one set in ordinary sea "water."

"In most instances, the neat briquettes submerged in sea water "acquired abnormal strength very rapidly, while on the other hand "the sand briquettes gained strength more rapidly in fresh water."

"The accompanying tables show tensile strength of six brands "of well known Portland Cement in fresh and sea water for stated "periods."

Table 1.—Tests of neat briquettes in Fresh and Salt Water:

Age.	7 days.		28 days.		2 months.		3 months.	
Water.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.
"A"	839	655	969	698	1047	703	961	622
"B"	772	505	955	637	1062	750	1089	822
"C"	481	504	664	619	706	628	756	635
"D"	657	581	749	666	778	636	738	612
"E"	686	486	867	575	925	564	880	655
"F"	655	557	811	663	959	725	841	659

Age.	6 months.		9 months.		12 months.	
Water.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.
"A"	843	579	939	624	813	663
"B"	644	807	281	789	137	711
"C"	666	642	389	707	153	760
"D"	117	672	107	684	0	706
"E"	737	615	711	573	335	612
"F"	800	667	826	747	791	782

Table 2.—Tests of one to three sand briquettes.

Age.	7 days.		28 days.		2 months.		3 months.	
Water.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.
"A"	256	282	368	338	340	362	340	365
"B"	205	190	265	308	299	347	280	400
"C"	142	169	219	243	240	295	264	311
"D"	231	247	335	369	343	373	285	415
"E"	222	191	333	299	402	390	279	420
"F"	229	267	238	361	254	388	259	414

Age.	6 months.		9 months.		12 months.	
Water.	Sea.	Fresh.	Sea.	Fresh.	Sea.	Fresh.
"A"	347	421	349	435	352	451
"B"	272	468	285	392	300	405
"C"	272	372	293	397	279	428
"D"	305	443	254	398	288	372
"E"	363	417	384	397	379	414
"F"	297	414	340	481	355	519

In 1896 a series of long time tests on concrete in sea water was started by the Scandinavian Association of Portland Cement Manufacturers, Copenhagen, Denmark, and we have included here some abstracts from the report on these tests made in 1909 by Mr. A. Poulsen, Chief Engineer of the Danish State Hydraulic Works.

"The tests in question may be said to be two-fold, in that they "apply to cube of mortar, about 3,500 in number, and to concrete "blocks which number over a hundred, 23.5 cubic feet in volume."

"From the Laboratory the test specimens were sent for ex- "posure to the action of sea water and climatic conditions, to the "Vardo Harbour at the extreme north east point of Norway; to "Esbjerg Harbour, at the extreme south western point of Denmark, "and to Degerhaum Harbour, on Oland Island, near the south eastern "point of Sweden, in the Baltic Sea."

Place.	Percentage of salt in water.	Average temperature above.
Degerhaum	½%	45° Far.
Vardo	3½%	32° "
Esbjerg	3½%	45° "

"At Degerhaum care was taken that the test specimens should "not be exposed to frost, by placing them sufficiently low under water "level."

"At Vardo and Esbjerg, a series of specimens was similarly "placed below the lowest sea level. A second series was placed "at the average tide level, this being exposed twice every day to "climatic effects, especially to frost and summer heat, which alter- "nate with the sea water action."

"The raising of these blocks was timed to take place after 3 and "6 months, 1 and 2 years, etc. A period of ten years has elapsed and "there are still at each place two cases filled with specimens, which "are to be raised after a total of 15 years and 20 years, but never- "theless we have already come to the following conclusion:"

" 'A' The chemical action of salt water is not alone able to deteri- "orate mortar. Portland Cement appears to be almost intact. Mr. "Czarnouasky has stated that in the Black and Caspian Seas, salt "has a marked effect on concrete. The percentage of salt in both "the latter seas, and the temperature of the atmosphere especially, "are much higher than in Scandinavia. At those two places, there- "fore, the salt has a more marked effect, while on Scandinavian "coasts, other action, especially frost, prevails."

" 'B' The deterioration of the mortar test specimens was due "mostly to the mechanical effect of frost."

"In comparing the test specimens from Vardo with those from "Esbjerg, and especially those that were placed at the average sea "level, a very great difference is found, although the water at both "these harbours contains practically the same proportion of salt, "3.5%."

"There is, however, a difference of 13° F. between the average "temperature of the atmosphere and of the water of these two "harbours."

"We have here the most important results of our tests, *i.e.*, the "predominating effects of a cold climate, while at Esbjerg and at "Degerhaum the test specimen kept pretty satisfactory for ten years; "only a few from Vardo have revealed a high resistance in the crush- "ing tests carried out at the Laboratory, a further proof of the "supposition that the disintegration of the mortar cubes was not "due to an internal chemical action, but to a mechanical effect on "the surface."

We have quoted these abstracts to show that the effects of sea water on concrete change greatly according to the quantity of salt contained in the water and according to the degree of temperature, so that it would be hard to deduce rigorously from the experiments made in the other countries, the behaviour of concrete at Prince Rupert or Sydney.

Some of the tests are contradictory, for instance, Mr. Poulsen says that the chemical action of salt water is not alone able to deteriorate mortar, and reports at the same time that Mr. Czar- nousky found that, in the Black and Caspian Seas, salt had a marked

effect on concrete. Mr. O'Meara on the Pacific Coast found that the sea water had a chemical effect on the neat cement and on mortars but did not make any tests on concrete. On the other hand, Mr. Wig, of the Atlantic City Station, says that the sea water there has an effect on cement but not on concrete, and that frost is the dangerous agent.

The only conclusion we can reach at first is that sea water containing less than 3½% of salt does not affect concrete, so that the first step to take would be to obtain an analysis of the sea water at the different points along the Pacific and the Atlantic Coast, also in the lower parts of the St. Lawrence.

If the percentage of salt is less than 3½%, it would leave the action of frost to contend with.

This destructive action of frost has never been noticed in any structure built on land and exposed to the ordinary climatic variation of our Canadian winters.

It would seem likely that this action is the result of the expansion produced by the freezing at low tide of the water which has filled the interstices of the concrete mass during high tide. This noxious effect could be avoided by making a very dense concrete or by making the face of the structure impermeable. There are many preparations on the market to render concrete impermeable but we consider that Mr. Page's method of adding oil to the concrete placed on the outside would solve the problem unless sea water even as low as 3½% of salt has a chemical action on concrete mixed with oil.

If the analysis of the sea water along our coast line reveals a percentage of salt higher than 3½%, we consider, judging from the information at hand, that it would be better to make some tests with cements of different composition in order to discover a cement which would not be affected by sea water even when it is strong in salt.

GEO. E. PERLEY,
Engineer in Charge.

ARTHUR SURVEYER,
Supervising Engineer.

REPORT OF THE COMMITTEE ON THE USEFULNESS OF THE SOCIETY AND EDUCATIONAL REQUIREMENTS.

At the several meetings held during the year, the question of educational requirements was fully considered, and the Committee now begs to submit its conclusions.

In its opinion, all applicants for admission into the Society, who have had no training in a technical school, should pass an examination, the nature of which is defined in the amendments to the By-Laws to be voted on at the 1912 Annual Meeting.

If these amendments are adopted, the Society should, without delay, provide the necessary machinery to carry on such examinations.

ERNEST MARCEAU,
Chairman.

REPORT OF THE COMMITTEE ON SEWAGE DISPOSAL.

The Committee has been increased by the addition of the following gentlemen:

H. N. Ruttan,	T. Aird Murray,
C. H. Rust,	W. M. Edwards.

Last year's report has been carefully considered and the following additions thereto have been agreed upon:

Page 69, insert after the second paragraph the following: "Some system of stand-by tanks should be installed to retain the first foul discharge for the purpose of subsequent treatment. It is evident that in order to provide for efficient sewage treatment the separate system should be adopted."

Page 71, in the first line before the word "travelling," insert "revolving and." On the same page, under *percolating filters*, after the word "matter," in the fourth line, insert "in the form of humus resembling ordinary soil."

Page 72, add to the second paragraph the following: "Percolating filters are being adopted for the cities of Regina, Moose Jaw, Saskatoon, Prince Albert, and Lethbridge, and for several of the smaller towns. In all such cases the filters are covered and provision made for artificial heat, if found necessary." On the same page, in the ninth line from the bottom, after the word "methods," insert "which do not include disinfection."

Page 73, at the end of the second paragraph, insert the following: "In cases where it is desired to disinfect sewage filter effluents, it will generally be advisable to provide sedimentation tanks for the removal of humus and suspended matter, as efficient disinfection is limited to the surface of suspended matters unless long and impracticable periods of contact are provided with an increase in the amount of chlorine otherwise required."

In the summary of conclusions, page 77, seventh line from the bottom, insert after the word "procedure" the following: "It, how-

ever, also appears reasonable, in the light of modern information, with reference to disinfection that much more can be done by the sewage producer than heretofore, and that the insistence in certain cases of the production of a sewage effluent as free from disease germs as possible, will go a long way towards maintaining the ordinary standard of purity of surface waters; at the same time the smaller communities, the individual, or the floating summer population, which may not be able to depend upon artificially purified water, and must necessarily use the raw water, will be protected in a greater measure."

The questions as per Appendix I, page 79, in the Report of the Annual Meeting for 1911, have again been submitted to all towns having populations of over 1,000, from which answers were not received last year.

The following additional replies have been received this year:

R. S. LEA,

December 11th, 1911. *Chairman.*

COMMITTEE.

R. S. Lea, *Chairman.*	C. R. Coutlee.
Willis Chipman.	E. J. Walsh.
J. S. Dennis.	H. N. Ruttan.
C. E. W. Dodwell.	C. H. Rust.
John Kennedy.	T. A. Murray.
R. W. Leonard.	W. M. Edwards.
C. H. Keefer.	

APPENDIX.

REPLIES TO QUESTIONS FROM CITIES AND TOWNS IN CANADA.

CANSO, Nova Scotia. Population, 1,617.

No sewerage system.

PORT HOOD, Nova Scotia. Population, 1,078.

1. No sewerage system.
5. Spring water.

SPRINGHILL, Nova Scotia. Population, 5,713.

At present no sewerage system. One to be installed in spring, 1912.

INVERNESS, Nova Scotia. Population, 2,713.

1. No sewerage system.
5. Stream from Cape Mabou Mountain.
6. No discharge of sewerage.
7. Not filtered or analyzed.

St. Stephen, New Brunswick. Population, 2,836.

1. Combined provision being made in some exits for storm water overflow.
2. Into tide water, River St. Croix.
3. Not treated.
4. None.
5. From a spring.

Summerside, Prince Edward Island. Population, 2,785.

1. Domestic only.
2. Into Bedique Bay.
3. Flushing only.
4. None.
5. Pumped from wells 300 feet deep.
7. One-half mile, pumped on hill.

Amqui Village, Quebec. Population, 1,070.

1. No sewerage system.
5. Supplied from pumps, wells, and river.
6. No.
7. No.

Asbestos, Quebec. Population, 2,224.

1. Separate.
2. Stream about 1,000 feet from Nicolet River.
3. No.
4. None.
5. From springs.
6. None.
7. Not filtered. Water has been analyzed and results satis factory.

Bagotville, Quebec. Population, 1,011.

1. No sewerage system.
5. From Rivière à Mais.
6. No.
7. No.

Bromptonville, Quebec. Population, 1,239.

1. No sewerage system.
2. No water supply.

COATICOOK, Quebec. Population, 3,165.

1. Combined.
2. Into Coaticook River, opposite the town.
3. No.
5. Springs, 1,200 feet above the town, carried in underground pipes.

DRUMMONDVILLE, Quebec. Population, 1,725.

1. For domestic purposes.
2. Into St. Francis River.
3. Not yet.
4. None.
5. St. Francis River, discharging into St. Lawrence River.
7. No.

GRANBY, Quebec. Population, 4,550.

1. Combined.
2. Into Yamaska River, below the village.
3. No treatment of any kind.
5. From a lake on Shefford Mountain.
6. No discharge into the lake.
7. No filtration.

GRENVILLE, Quebec. Population, 1,383.

No sewerage system.

IBERVILLE, Quebec. Population, 1,905.

1. Combined.
2. Richelieu River.
3. No.
4. None.
5. From the river, above sewerage.
6. Distance, one-quarter of a mile.
7. Analysis has been made and found satisfactory.

HUDSON, Quebec. Population, 1,210.

1. No sewerage system.
5. From elevated springs.

LAKE MEGANTIC, Quebec. Population, 2,399.

1. Combined.
2. Into Chaudière River, near Lake Megantic.
3. No.
5. From springs and streams.
6. No factory in the vicinity, and no discharge of any kind.
7. No analysis has ever been made.

LAUZON, Quebec. Population, 3,978.

1. Domestic sewage only.
2. Into the St. Lawrence River.
3. No.
4. None.
5. From small spring, south of village.
7. Waterworks commenced a few years ago as a private enterprise, have not yet been completed.

LENNOXVILLE, Quebec. Population, 1,211.

1. Combined.
2. Discharge into the St. Francis and Massawippi Rivers. Point of outlet carried well into the stream.
3. No.
4. None.
5. The St. Francis River and springs. St. Francis River discharges into Lake St. Peter.
6. Pulp mill fifteen miles above. Intake, half a mile above sewage discharge.
7. No filtration. Analysis made from time to time and resu'ts have always been satisfactory.

MAISONNEUVE, Quebec. Population,

1. Combined.
2. Into St. Lawrence River. Two outlets.
3. No.
4. None.
5. Montreal Water and Power Co. St. Lawrence River, and some of Ottawa River at low water season.
6. Quality of water supply satisfactory.
7. Water supply will be filtered in summer, 1912.

MARIEVILLE, Quebec. Population, 1,587.

1. Combined sewerage system commenced, but will not be completed for two years.
2. Into a stream.
3. There will be a system of purification.
5. Rougemont Lake. About 15 to 20 acres in circumference.
6. No discharge into lake.
7. The water is good.

MATANE, Quebec. Population, 2,056.

1. No sewerage system.

NICOLET, Quebec. Population, 2,593.

1. Combined.
2. Nicolet River.
3. No.
4. No.
5. Nicolet River, discharging to St. Lawrence River.
6. No near discharge.
7. No.

STE. AGATHE DES MONTS, Quebec. Population, 2,020.

1. No sewerage systems.
2. No.
3. No.
4. None.
5. From a lake, ¾ of a mile by 800 ft.
6. No sewage discharge into the lake.
7. Water not filtered nor purified.

ST. AUGUSTIN, Quebec. Population, 1,215.

5. Wells.

ST. JOHNS, Quebec. Population, 5,903.

1. Combined.
2. About one-third direct, the remainder by brook to Richelieu River.
5. Richelieu River.
6. No discharge. Distance between intake pipe and discharge of sewage about 1½ miles.

St. Lambert, Quebec. Population, 3,350.

1. Domestic sewers only at present, combined system to be used.
2. Into St. Lawrence River.
3. Sewage not treated.
5. From St. Lawrence River.
6. Practically no sewage is discharged above the water intake.
7. Unfiltered. Analysis has been made by Provincial Health Board, and found quite satisfactory.

St. Raymond, Quebec. Population, 1,653.

1. Separate. Partly domestic sewage only, and partly provide for storm water and stream.
2. Stream to Ste. Anne River.
3. No, except by water sewage.
4. None.
5. Spring.
7. Pure spring water.

Terrebonne, Quebec. Population, 1,990.

1. Domestic and for street drainage.
2. Into River Jesus, opposite Terrebonne.
3. Sewers in good condition, quantity of water abundant and no need for purification.
5. From springs on hill, two miles from the town.
7. Spring water, is filtered naturally through sand. It has been analyzed and reported excellent for domestic use.

Thetford Mines, Quebec. Population, 7,261.

1. Combined, except one for storm water.
2. Into Thetford River.
3. No.
5. From two rivers upon the hills.
6. None.
7. The water has not been filtered, but has been analyzed with good results.

Valleyfield, Quebec. Population, 9,447.

1. Combined.
2. Branch of St. Lawrence River, passing on this side of Grand Ile.
3. No.
5. From Lake St. Francis on the St. Lawrence River.
6. No, nearest town above is Cornwall, Ont.
7. Not filtered, not purified. Analysis made by Provincial Board of Health.

LEVIS, Quebec. Population, 7,448.

1. Domestic only.
2. Into the river.
6. Distance between supply and discharge is 1,200 ft.
7. No filtration.

BROCKVILLE, Ontario. Population, 9,372.

1. Separate. Extent of system 15 miles.
2. Directly into river, main outlet near easterly limits, discharge from small area near westerly limits.
3. No.
4. Not treated.
5. River St. Lawrence.
6. Not much above intake, main outlet of sewer about 1,500 feet down stream from intake.
7. Not filtered or treated. Analyses made at least monthly, which show supply to be comparatively pure.

CORNWALL, Ontario. Population, 6,436.

1. Combined. Extent of system 10 miles.
2. Directly into River St. Lawrence.
3. No.
4. No tests have been made.
5. From the River St. Lawrence.
6. Very little below the Long Sault Rapids.
7. No.

GANANOQUE, Ontario. Population, 3,764.

1. Separate. Extent of system 5 miles.
2. Discharge into St. Lawrence River east of mouth of Gananoque River.
3. Neither treated nor purified.
4. No tests made.
5. From St. Lawrence River, half a mile above mouth of Gananoque River.
6. No sewage or factory refuse discharged into the river above Gananoque, between Gananoque and the city of Kingston.
7. Neither filtered nor purified. Analyses made have shown the water to be satisfactory and pure for domestic purposes.

HAMILTON, Ontario. Population, 81,881.

1. Combined.
2. About six main sewers, three of which go to disposal works.
3. One bacteriological, two chemical, using lime and alum. Not operated one winter yet.
4. Tests have been made, but results not in yet.
5. Lake Ontario.
6. About seven miles.
7. Water settled in basins, about 1/10% filtered.

LINDSAY, Ontario. Population, 6,956.

1. Combined. Extent of system five miles.
2. Discharge directly into Scugog River, below the lock.
3. Not treated or purified.
4. None.
5. From Scugog River, above the lock.
6. No discharge of sewage or factory refuse above water works intake.
7. Water treated by the Ozone process. Results of analysis in reports of Provincial Board of Health.

SAULT STE. MARIE, Ontario. Population, 10,986.

1. Separate. Extent of system 12 miles.
2. Directly into St. Mary's River, at twelve different outlets along river front.
3. No.
4. None.
5. St. Mary's River, above the rapids. Average for a period of 50 years, 72,000 cu. ft. per second. Greatest known 115,000 cu. ft. per sec., least known 34,000 cu. ft. per sec.
6. No, about a mile.
7. No. Frequent tests made by Provincial analyst with good results.

STURGEON FALLS, Ontario. Population, 2,188.

1. Separate system.
2. Main sewer discharges into Sturgeon River, below the dam.
3. Not treated nor purified.
4. No tests made.
5. Sturgeon River, above the dam.
6. No sewage discharged into stream above dam.
7. Not filtered. Analyses made prove water supply satisfactory.

WELLAND, Ontario. Population, 5,311.

1. Combined. Extent of system 11 miles.
2. All discharge into Welland River. Eight outlets.
3. Not treated nor purified.
4. No tests made.
5. Welland Canal.
6. No sewage discharge into canal.
7. Not filtered at present. Preparations now being made for filters or settling basins. Analyses made periodically; last analysis May 12th, 1911, shows absence of bacteria of intestinal origin; streptococci, none; colon bacilli, none; colonoid bacilli, none; chlorine in parts per million, 10.

Memo. submitted by Mr. Willis Chipman, Member of the Committee, in regard to the last year's report.

(*a*) The following places have a population of less than one thousand and should be omitted:—

Bruce Mines.	Marmora.
Brussels.	Norwood.
Glencoe.	Tavistock.
Maxville.	

(*b*) The following places are in Alberta, not in Ontario:—

Innisfail.	High River.
Raymond.	

(*c*) The following places in Ontario are without sewerage systems, notwithstanding the reports given by municipal authorities:—

Port Hope.	Iroquois.
Georgetown.	Penetanguishene.
Morrisburg.	

(*d*) The following places in Ontario of over one thousand inhabitants are provided with water works systems but are without sewerage systems. These places are not mentioned in the Report:—

Alexandria.
Alliston.
Aurora.
Aylmer.
Beamsville.
Bracebridge.
Burlington.
Chesley.
Clinton.
Dundas.
Durham.
Essex.
Gravenhurst.
Grimsby.
Hanover.
Hawkesbury.
Huntsville.
Ingersoll.
Keewatin.
Kincardine.
Listowel.
Meaford.
Merritton.
Milton.
Niagara.
Orangeville.
Paris.
Port Elgin.
Port Perry.
Seaforth.
Southampton.
Stouffville.
Strathroy.
Tillsonburg.
Whitby.
Wiarton.
Wingham.

(*e*) The following places in Ontario are without water works systems or sewerage systems; they are not mentioned in the report and each exceeds one thousand population:—

Acton.
Almonte.
Beaverton.
Blenheim.
Blind River.
Brighton.
Carleton Place.
Cochrane.
Eganville.
Fenelon Falls.
Fergus.
Forest.
Gore Bay.
Hagersville.
Harriston.
Hespeler.
Little Current.
Madoc.
Mattawa.
Mimico.
New Hamburg.
Norwich.
Parkhill.
Port Dalhousie.
Port Dover.
Portsmouth.
Ridgetown.
Rockland.
Stayner.
Tweed.
Wallaceburg.
Watford.
Winchester.

(*f*) The following places probably have water works systems for fire protection, but no sewerage systems:—

Campbellford.
L'Orignal.
Uxbridge.
Vankleek Hill.

(*g*) The town of Sarnia, with a population of 9,930, has a water works system, and sewers on the combined system. The crude sewage discharges into the St. Clair River below the water works intake.

REPORT OF THE COMMITTEE ON THE INTERNATIONAL ELECTROTECHNICAL COMMISSION TO THE CANADIAN SOCIETY OF CIVIL ENGINEERS.

The Canadian National Committee of the International Electrotechnical Commission held two meetings at its headquarters, Ottawa, during the past year, one in July and the other in October. Considerable correspondence passed between the members regarding the matters of universal symbols, rating of machinery, direction of vector rotation, etc.

The Canadian Committee was represented at the International Electrotechnical Congress at Turin, Italy, in September, by its delegate, Professor L. W. Gill, of Kingston, who made a complete report to the Committee on the work carried out at this Congress. The main accomplishment at this Congress was the adoption of a number of proposals which had previously been referred to the various National Committees, principally as regards matters cited above, and as regards the rating, performance guarantees, method of testing, etc., of electrical apparatus.

Subcommittees have been formed during the year, chief among them is one to study a proposed revision of the Canadian Electrical Units Act.

The Committee desires to acknowledge with thanks donations of $100.00 each from the Canadian General Electric Co. and the Canadian Westinghouse Co., and from your Society.

At the Congress Dr. Budde, of Berlin, Germany, was appointed President of the International Commission, in place of Professor Thompson, whose term had expired.

Montreal, December 11th, 1911.

COMMITTEE:

Dr. L. A. Herdt, *Chairman.*
Mr. O. Higman, *Vice-Chairman.*
Dr. H. T. Barnes.
Prof. L. W. Gill.
Prof. T. R. Roseburg.
Mr. W. A. Duff.
Mr. J. Kynoch.
Mr. J. Murphy.
Mr. A. B. Lambe, *Secretary.*

L. A. HERDT,
Chairman.

Committee on Steel Bridge Specifications.

(This Committee presented specifications which after revision will be submitted to the membership for approval.)

Discussion on the Report of Council.

Mr. Skaife — Mr. Skaife.—I move that the report be received.

Dr. Galbraith — Dr. Galbraith.—I second the motion.

Carried.

The President — Is there any discussion on the Report of Council?

Mr. Jamieson — Mr. Jamieson.—This report is particularly notable for one thing, and that is what it does not contain. The Council and Officers of the Society during the past year have transacted a good deal of business at their meetings, and important matters no doubt have come up, but they have not seen fit to take the great body of the membership into their confidence in any respect. The report does not tell us anything of the business transacted or the questions considered. It is made up partly of the financial statement, with additions to members, and so on, but in none of our publications issued during the year is there any synopsis given of matters of importance dealt with, that may affect the general welfare of the Society or of its individual members.

In this respect a great difference exists between this Society and other engineering societies. The American Society of Civil Engineers, for instance, in the monthly Proceedings, gives a synopsis of the matters that have been brought before the Council or before the Board of Directors at each meeting, and informs the members of what the directors have been considering. There is not one word of anything of the kind to be found in the Report of Council or in the Proceedings of our Society. Now, I think that this is entirely wrong. The members are fully entitled to be taken into the confidence of our Officers and Council.

There has been an increasing tendency during the past few years to concentrate everything in the Council and in the Officers of the Society, and to deprive the membership of any voice in Society affairs. If the Officers and Council are very competent men, and conduct the affairs of the Society so ably that we can make no criticism, then everything is satisfactory, but if not, then the policy adopted is at fault.

I am not criticizing particularly the acts of the present Council, nor those of any individual. It is simply a matter of principle. What we are looking for is results, and in regard to the District of Montreal, at least, the Society was never so dead as it is at the present time. The meetings are, as a rule, very poorly attended.

We have had a number of very interesting lectures and one or two papers, but our *Transactions* compare very unfavourably with those issued by similar societies.

Now, if this be true, there must be some reason for it. What is it? It is not due to the fact that we have not plenty of able engineers in this country, or that we are not carrying on an immense amount of engineering work, a description of which would result in very excellent papers. The reason lies in the fact that all the affairs of the Society are concentrated in the Council.

Under "Objects of the Society" in the By-Laws I find "The object of this Society shall be (1) to facilitate the acquirement and interchange of professional knowledge among its members, and (2) to encourage original investigation."

The fulfilment of this object is the only real reason to justify our existence, and yet there is no tangible evidence that we are in any sense fulfilling it.

I know that the Chairman of the Committee on Papers has worked particularly hard during the past year to secure good papers, but he has had very little success. A number of lectures on matters that were very interesting were given, but these did not seem to bring out any discussion.

Again, I wish to refer to the attendance at meetings, particularly that of the officers in the Council. It appears that members when elected to the Council either become too busy or feel that the honour conferred upon them puts them beyond the necessity of presiding at meetings, and taking part in any discussion. Now, I think that when the Society has sufficient confidence in its members, to elect them to this high position, they should not forget that they owe a certain amount of time and work to the Society's affairs, and that it is very discouraging to the author of a paper to find practically none of the members of the Council present. I am speaking very generally on this matter. I know that a large number of the Council are too far away to be able to come here, but the local members certainly should attend more frequently. Of course, there are exceptions, as some of the Council do attend regularly.

There are a number of members who regret very much this lack of interest in the affairs of the Society, and during the year I had occasion to make certain suggestions in regard to it. It does not appear to me that the Council takes suggestions in a kindly spirit from those members who have the interests of the Society at heart.

Personally, it looks as though as our system—or I might almost say our lack of system—in the conduct of the affairs of the Society has become obsolete. We are not keeping up to the times, though our methods are probably in line with the average City Council that is being largely replaced by Boards of Control. We seem to lack an executive head; that is to say, the President generally resides at a

very considerable distance from headquarters, and if he attends the meeting he has to do so at considerable expense and sacrifice of time. The result has been that we do not always look upon the President as the executive head, but as an honorary officer presiding at our annual meeting, and on every other occasion, of course, when he can be present.

The time of the Council is very fully taken up, I know, by routine matters, and that of the Secretary and his staff with a large amount of correspondence, but there seems to be a lack of an executive head to initiate and carry out matters which involve the general good of the Society.

This Society certainly is not taking the place in the country that a large and influential national society should take. We have not the prestige, and though possibly we have only ourselves to blame for this, I sincerely hope that some plan will be formulated by which there will be an improvement.

The President I would like to ask Mr. Jamieson what additional information he wants in the report of the Council. As to the executive head in Montreal, during this past year, we have had Mr. Holgate, who has devoted a great deal of his time to the interests of the Society. The chief problem has been the difficulty in getting papers to read at the meetings. I know that Mr. Vaughan has spared no effort in this respect, but the question of papers rests entirely with the members of the Society themselves. We should get better papers and more of them, but it is certainly not the fault of the Council.

Mr. Jamieson I agree that it is the duty of members of the Society to supply papers, but it is a fact that the members do not care to supply valuable papers, which are practically buried in the *Transactions*, for they are scarcely looked at by the members of the Society, and certainly by nobody else. Unless we make a great improvement in our *Transactions*, we cannot expect to get papers of the quality desired This year there was not a business meeting scheduled for the whole season. We never get together in any way except to come for a paper or a lecture.

Another criticism I would make is that we are lacking entirely in some system of welcoming and introducing the members from all over the country who come to the meetings. Such members often go away after hearing a paper, feeling that they have been regarded as strangers. We must do something to wake up and create an interest in the Society, if any advancement is to be made.

The President Is not that the fault of the local members themselves?

Mr. Jamieson Perhaps it is, but it seems to me the Council is open to criticism for its inaction in this respect.

Mr. T. K. Thomson.—If you will permit me, gentlemen, I would say that, recently having been elected a Director of the American Society of Civil Engineers, I have come up here to learn something, because in the United States we think the Canadian Society of Civil Engineers is an example to be followed, having started in the right way as regards legislature. We have four great national societies in the States, each of which has entirely different grades of membership, and in consequence we cannot get any legislation. I had not been elected a Director of the Society one hour before I had probably a dozen members telling me of very urgent improvements that ought to be carried out and as many other members forming themselves on the opposite side of the question. For everyone who made a suggestion there would be others who opposed it. Mr. Thomson

Now, I would like to make one suggestion in connection with papers that are presented to the Society, which is to read abstracts rather than a long and possibly tedious paper. We have eliminated altogether the reading of long mathematical papers in the Am. Soc. C.E., because we consider that the chief interest of a meeting lies in the discussion. The only way good discussion can be obtained is by having the author of the paper interest his friends sufficiently to induce them to come to the meeting and start the discussion. When I write a paper I would rather have the members tear it to pieces than have no criticism of it whatever.

Another point is that of the membership fee. In the United States we have a membership of about 6,000 and the full members pay $25. In my opinion a decided advantage would be gained by increasing the fees of this Society, which would permit you to remunerate properly your Secretary for the immense amount of valuable hard work he does. The present remuneration is about one-twentieth that paid in the United States, and is, of course, absurd.

I think that Mr. Jamieson's trouble would be remedied if the Society would appoint a reception committee to meet outside members and introduce them to each other. Mr. Skaife

Mr. Vaughan.—I cannot quite make out Mr. Jamieson's meaning. (Laughter). We have in the report the matters which came before the Council during the past year. I have attended the meetings of the Council regularly, and I don't know of anything of interest to the members that has been left out of this report. Surely Mr. Jamieson does not wish us to publish the discussion of the Council or the routine work that goes on at each meeting. The Council meetings are largely devoted to a classification of members and discussion of the details of branches and business of that sort. I think that when the report of Council is criticized some specific omission should be stated. Mr. Vaughan

An executive head is very desirable, but I consider that the Montreal portion of the Council does practically constitute itself an executive committee for the conduct of the affairs of the Society.

Mr. Jamieson's contention seems to be that we cannot have good *Transactions* unless we have good papers, and that we cannot get good papers unless we get good *Transactions*. In a Society like this where the members are scattered over an immense territory, and where the conditions of the country are as prosperous as at present, everybody is too busy to write papers. It is more easy to obtain papers when engineers are not quite so busy and have the time and the desire to write papers in order to advertise themselves or tell what they are doing. Consequently, this year we endeavoured to get lectures on subjects that would be interesting, and I am very much surprised to hear Mr. Jamieson say that our meetings have been poorly attended. We have had good attendances in the majority of cases in Montreal, so far as I am aware. This room has been filled on several occasions, and that is really all we can hope for.

The question of papers must, I think, be left to settle itself. Speaking as Chairman of the Committee, all I can say is that any good papers will be heartily welcome and arrangements made to present them to the meetings.

Now, as far as this discussion is concerned, and the reference that has been made to the officers of the Society, I must say that our Secretary has certainly done good work. (Applause). He has been indefatigable in urging members to come to the meetings and enter into the discussions. I do not think that any more could be done, and I am sure no executive committee could do anything more than Professor McLeod has done. Possibly a reception committee might be an advantage, but this year we have inaugurated refreshments after the monthly meetings with the idea of giving members an opportunity of meeting each other.

As far as the members of the Council being present at all these meetings is concerned, when a meeting of the Society is held on Thursday and the Council has a meeting on Saturday, it is a good deal to expect Councillors to attend both meetings all through the session. Most of the local members of the Council have taken a good deal of interest in the meetings during the past year.

As far as I am concerned I would certainly like an executive committee to take the responsibility of the papers, as it is a problem that such a committee could effectively undertake.

Mr. Jamieson

If Mr. Vaughan is right, and I take it for granted that he is, in regard to all possible information having been given, then we must understand that the only matter the Council has dealt with has been the passing of members and the business of the branches, and that

no great or important questions came before the Council to decide upon during the year. Well, if that is so, it is not as we should expect it. We should expect that they were taking a larger part in affairs than would be indicated in the report.

Mr. Vaughan has entirely misunderstood me in regard to the papers. I do not think it is an easy problem to secure these papers, but I think it is quite possible to have both good *Transactions* and good papers at the same time. The point I wish to make is that there is a feeling of dissatisfaction on the part of the members about the *Transactions*. I know that there are a number of excellent papers to be had if things were in a more satisfactory condition.

If Mr. Jamieson would give us the names of these satisfactory papers and let us get them, it would put the Society in better condition. Mr. Vaughan

You cannot get them until the Society is in a better position. Mr. Jamieson

Mr. Stead.—If a reception committee is to be appointed, I would move that it be appointed now. I have come here from New Brunswick and have met a number of old friends, but I have not been introduced to any other members, and I think it would be a great advantage in attending these meetings to meet the different members.

Do I understand that in moving the adoption of the Report of Council, the motion includes everything in the report? Mr. Jamieson

Yes, everything done during the year. The President

That is down on page 16 of the report. Mr. Jamieson

Yes. The President

Well, on page 16 of the report, I find the following:— Mr. Jamieson

"The Chairman of the Nominating Committee for Officers and "Members of Council has suggested the following procedure for the "conduct of the business of the Committees, and the Council has "endorsed the same and recommends it to the Annual Meeting for "its approval." Does that mean, Mr. President, that this will be adopted without any discussion?

The members are requested to discuss the Report of Council. The President

If it is in order to discuss it now, I most emphatically disagree with the suggestion made there by the Council. The question of a Nominating Committee has been for a long time on an unsatisfactory basis, and it has not at all improved in recent years. If we adopt this suggestion, it would be better to discontinue the appointment of a Nominating Committee, and make the three immediate past presidents a Nominating Committee for the Society. If we elect a Nominating Committee we surely elect them to act and do their duty as an entirely independent Committee representing not any one part, but the members as a whole. Mr. Jamieson

I would like to point out the difference in procedure between the American Society of Civil Engineers and that of our own Society.

In the American Society great care is taken with regard to this matter. In the first place the Secretary of the Society sends out a circular or ballot to every member of the Society as follows:

"I suggest for member of the Nominating Cmmittee to be ap-"pointed by the Annual Meeting the following," then there is a blank left for the insertion of the name of the member suggested. Now, that method gives every member an opportunity to make a suggestion, and send it in to the Secretary, who acts as Secretary for the Nominating Committee. When these ballots or suggestions come in, the first three that get the highest vote are then put on a list which is sent out to all the members again, and, should there be any further suggestion, the members are given an opportunity to make it. The final selection made from that list constitutes the Nominating Committee. This Committee then elects the President, and goes through practically the same process to ascertain the feeling of their members in the district as to whom they should nominate for the Officers of the Society or Board of Directors for the ensuing year. This procedure has worked out very satisfactorily indeed.

Then the nominations are made by the Nominating Committee and distributed in the usual way, with the same provision as ours, viz., that ten corporate members may petition or send in an extra name to be nominated for office. When received this name is put on the ballot in exactly the same form as the names that have already been submitted for election by the Nominating Committee.

As Mr. Thomson has just been elected a director of the American Society, he knows perfectly well that this method puts them all on the same basis, so far as the general membership goes.

I am strongly in favour of the names being selected by the Nominating Committee, but the Nominating Committees may make mistakes. The provision that a certain number of members should be able to submit a nomination is a very fair one, but in this Society such names are put in a separate list, which has the effect of annulling the whole object of the provision in the By-Law. There have not been any extra nominations this year, but there have been in past years, and this method did not in any sense meet the intention of that provision in our By-Laws. Should such nominations occur in future they should certainly be put on the same basis as the others.

I do not think that this meeting should concur in the suggestion that has been made in regard to the Nominating Committee. Let us have this Committee so independent and so much in touch with the members as a whole, that there will be no cause for complaint.

Some time ago we adopted our By-Laws from the Constitution of the American Society, but we absolutely failed to adopt their procedure. We took our old machinery to work with new By-Laws,

and it certainly has not been a success, nor can it ever be satisfactory.

Mr. Thomson

As Mr. Jamieson has referred to the American Society of Civil Engineers, I would like to state that there are a number of societies in the United States radically different in their constitution and method of procedure. One society, I believe, has absolutely free and open nominations. At their annual meeting any member can make any nomination he wishes, for the most important office. Now, imagine Andrew Carnegie, for example, calling a meeting at his works and allowing anybody to nominate any person he wished to fill the position of President of the Carnegie Steel Company. It seems to me that no person should be nominated that is not known to be perfectly competent to fill the position, and that a member should first be Vice-President and then perhaps, if his services are satisfactory, the Society at its annual meeting might elect him president. The most vital part of any society of this kind is the Nominating Committee. The best organized society to my knowledge has as one of its rules that the past presidents of the Society form the Nominating Committee, of which the last past president is chairman. In that case all the past presidents are known. They are all picked men and they certainly ought to have the interests of the Society at heart, and never make hap-hazard or poor nomination. I do not think you can improve upon that idea.

Dr. Galbraith

I may say that I do not quite understand Mr. Jamieson's attitude with respect to either the Nominating Committee or this proposal, as to the method of making nominations. It seems to me that the nominations are all on exactly the same footing under the present arrangement. The peculiarity of our method is that not only the persons who are nominated are known to the Society beforehand, but also the names of the persons who nominate them. They are all on exactly the same footing as far as that goes. If the names were put in the same list and no names of the nominators other than the Nominating Committee were published, then the Society would be under a false impression.

Mr. Jamieson

The names of the nominators are sent out in a separate letter.

Dr. Galbraith

Then you do not mean that the names of all the nominees should be published in one list without the names of the members who nominated them?

Mr. Jamieson

When the final ballot goes out it should have the names only on it, as previously all members have been advised of the extra nominations and the names of those who nominated them.

Dr. Galbraith

I misunderstood your statement, and have therefore nothing more to say on that question. It is quite proper that every one should know who nominated a person to office.

With regard to free nominations by members of the Society as compared with the nominations under the present system, I quite agree with Mr. Thomson. I think that on the whole the method of nominating adopted by our Society in the past is far better than the system of free nominations. Free nominations will work very well in a society having a small membership, but certainly not when applied to a society with as large a membership as ours.

Mr. President, we are discussing this report of the Council in a manner that is not altogether correct, or systematic. There are certain proposals made by Council in this report. In my opinion, it would be better for our records if the report were taken up clause by clause, motions proposed on each of the suggestions that are made, and the matters discussed and carried systematically. For instance, there was a proposal before the one which Mr. Jamieson has spoken of, and while it may save time to proceed in that way with the question of the Nominating Committee, and its method of working, yet I would propose that after we have disposed of that question, we go back and take up the suggestions clause by clause, move their adoption, discuss them fully, and make our decision.

The President I would ask Mr. Fairbairn, the Chairman of the Nominating Committee, to address the members.

Mr. Fairbairn Mr. Fairbairn.—I am rather at a loss to know what Mr. Jamieson wants,—whether he wants a revision of the By-laws to change the whole system of nomination, or merely to eliminate the suggestion of the Nominating Committee of the past year. If the former, I don't know that I have very much to say in regard to it. I do not think that the By-laws as they stand to-day are any worse than the By-laws of any other society, in fact I think they are a great deal better, and that our method of nominating members for Council and for the various offices is as satisfactory as can be adopted in a society as large as ours.

In regard to the nominations this year, some conditions arose that led me to think that possibly a more systematic method might be followed, and it was with that in view that I made the suggestion contained in the Report of Council. Our By-laws have been so worded as to make the members of the Nominating Committee practically representative of the various districts. These representatives, who are usually the officers of the various Branch societies, know better than anybody else which members in their district are eligible for Councillors. Such nomination of members of Council to represent those districts can doubtless be better made by the representative members of the Branches than by anybody else, and it occurred to me that it was better to have the selection of the names confined entirely to these representatives rather than to the honor-

ary members, as we might call them, namely the three past presidents.

For the more important offices—that of President and Vice-President,—nobody knows better than the past presidents of the Society who are familiar with the various members of the Council for years past, which members are most competent to occupy those positions. Certainly they are much better qualified to do so than a representative from a district whose ideas must be more or less local. These considerations have led to the suggestion in the report, and I might further explain it by saying that the list of names suggested under this arrangement by the past presidents and by the local representatives of districts would be submitted to the chairman, who would distribute them to the members of the Nominating Committee, so that one would have a chance to vote and reduce them to a moderate number, to submit to the Society for election. This simply menas that the representative of districts will nominate members of Council from their own district. The past presidents will nominate the officers for the two higher offices—the President and Vice-President,—and the Nominating Committee will have the opportunity of choosing from the names submitted a list to be sent to the membership for election. This method, in my opinion, under the By-laws cannot be very much improved. It was carried out as far as possible this past year. I obtained suggestions from many members and submitted them to the Nominating Committee as a whole, after which we reduced the list to the proper number. The mere fact that there has been absolutely no mention of any opposition seems to indicate that there is a degree of satisfaction in this method of handling the proposition.

Mr. Jamieson

I want it to be distinctly understood that I am not criticizing the work of the Nominating Committee in any sense. As a former member of this Committee, I have encountered these problems, but what I am contending for is the very thing that Mr. Fairbairn, as Chairman of the late Nominating Committee, referred to; that is, to keep in touch with the general membership in its nominations, which he has done, instead of dividing the responsibility amongst others. Now, either we must have a Nominating Committee responsible to, and in touch with the members generally, or else abandon the Committee, and make our past presidents the Nominating Committee, but the two methods cannot be combined. The problem is one of the most difficult to deal with in this Society, and one of the most important, for the Nominating Committee must do its duty thoroughly and well, and in a non-partisan manner. I believe there are plenty of members of this Society who are perfectly capable to act on the Council, and that this office should not be monopolized continuously year after year by the same men, even though

they may be doing excellent work, and have done excellent work in the past. We now have a term of office of three years, at the end of which, I think, they should retire. Our membership is now about three thousand, and out of these 3,000 members, surely there is enough good material for representation on the Council. I feel very strongly on this question of the Nominating Committee keeping in touch with the general membership.

Mr. White

MR. WHITE.—I am quite in agreement with part of what Mr. Jamieson has just said, and I think the arrangement as suggested by Mr. Fairbairn, with possibly a little amplification, will meet the case admirably. We do not want autocratic methods in our Society, but democratic methods. Under the present arrangement we have practically a Nominating Committee for each district. Last year, as the member for the Ottawa district, I intended to have a ballot from the members of that district, and the nomination for the member of Council for the Ottawa district, but unfortunately, owing to the absence of the Chairman and the Secretary, I was unable to carry out the idea. The member of the Nominating Committee for each district should make the nomination, but before doing so he should have the Secretary of the local Branch send out a ballot to each member so that the votes from the different members of the local Branches could be obtained, and the nomination be based on that. In regard to the Committee nominating members from the Atlantic to the Pacific, I do not think that method is satisfactory, and there is nothing more calculated to build up and perpetuate an oligarchy. How could I vote for or nominate a man for Halifax or Vancouver? It seems to me quite unreasonable. The other system by which we receive a ballot from the members of each district would be quite satisfactory.

On the other hand, the system of having the past presidents for three years make the nominations, has the same oligarchical tendency, and is in my opinion objectionable. I hope at the next meeting to have an opportunity of voting on the amendments to the By-law, which authorizes that change.

Mr. Fairbairn

Do I understand that you do not think the past presidents should have a voice in the nominations in connection with the offices of President and Vice-President, or that only the elective members of the Committee should have that right?

Mr. White

I think the past presidents, as such, should not be members of the Nominating Committee for Council.

Mr. Fairbairn

Under the By-laws at the present time they are members of the Nominating Committee, and the idea in this was to limit them to suggesting the nominations for the offices of President and Vice-President.

As I understand this proposed amendment, they would have the whole say with regard to the President and Vice-President. Mr. White

They would suggest the nominations, but the whole Nominating Committee at large has the cutting down of the list that they would suggest. The Nominating Committee has the right to ask for as many names from them as desired. Mr. Fairbairn

The only objection to that is that there are nine districts. Therefore, there are nine members of the Nominating Committee plus the three past presidents, which would make twelve in all. Each past president should have one vote out of twelve; that is, they should not have the whole say in regard to the nominations of President and Vice-President, and I would absolutely exclude them from any nomination with regard to Council. Mr. White

The only mistake in having the presidents on the Nominating Committee is that it is limited to three. If you make all the past presidents members of the Nominating Committee it would be only a question of time before every section of the country will be represented. To my mind the Chairman of the Nominating Committee is a more important position than that of the President of the Society. The idea of having an open nomination for the Nominating Committee is one of the most easily controlled things in the world. Three thousand to six thousand men are asked to propose some member for the Nominating Committee. One thousand names may be sent in with one vote each, and one or two men can put in anybody they like. Mr. Thomson

Do I understand Mr. Thomson to say, when he refers to the past presidents, to make them a Nominating Committee exclusively, without any other Nominating Committee? Mr. Jamieson

Yes. Any members should be allowed to nominate whom they choose, but I don't think that they should have the same prestige as ten past presidents. Mr. Thomson

Mr. Clement.—Does the Council include this in the report as a hard and fast practice that is to be approved, and if so, does it have to be of the nature of a By-law, or is it a suggestion of the Nominating Committee? Mr. Clement

I don't think a By-law is necessary. The President

Is it to go in the rules and By-laws of the Society as a procedure of the Nominating Committee, or is it a recommendation for Nominating Committees? Mr. Clement

If this is decided upon, it will be adopted by the Society as the proper procedure. The President

I don't think you can do that. I think we have By-laws already governing this, and it would have to be an amendment to that By-law. Mr. Jamieson

Mr. Chipman

MR. CHIPMAN.—I, for one, am quite satisfied to leave the By-laws as they are. I think Mr. Fairbairn has interpreted them in the proper way. His recommendation is only a suggestion for next year, and his successor on the Nominating Committee will probably suggest something else, perhaps better. In the meantime it seems to me we can spend our time to better advantage than in discussing this matter further.

MR. JOHN KENNEDY.—I fully agree with the last speaker. I think any member of the Society of several years' standing will remember just such discussions as this over and over again. In all societies the Nomination question is a difficult one—I refer to the matter of nominating members to the Council. As a matter of fact, we have been pottering with the By-laws every two or three years, changing them from time to time. The American Society has already made several changes, and probably in a short time will make more. Oud present method has worked very well thus far. We have had good Councils all the time and it does not matter in real practice who are the members of the Nominating Committee, nor the members of Council, for the City of Vancouver or the City of Halifax or indeed any place beyond Toronto, Quebec and Ottawa. It is really these and the Montreal members of the Council who have to carry on the business of the Society. We have to see that the are of the right sort, but beyond that it is all a mere academic discussion. If the proposition is merely a recommendation to the Nominating Committee, leaving the representatives to deal with their districts, it is all right, but otherwise we should not in this off-hand manner pass a resolution which would actually change the By-laws. I think the past presidents ought to be members of the Nominating Committee, but it would not be exactly wise for the Committee to bind itself to agree to the nominations of past presidents. I think the present system should be continued, and in adopting this report, let it be understood that this is a mere suggestion for the good management of the business of the Committee, rather than a matter of By-law.

A MEMBER.—I would like to second the motion made some time ago, which seems to have been ignored—the motion by Mr. Stead to the effect that a Reception Committee be appointed. We members from the West come here to meet the members from the East, and, as Mr. Thomson has said, we ought to know the officers for whom we are voting. I wish to second the motion of Mr. Stead, because it is desirable to meet the different members of the Society at these annual meetings.

Mr. Stead

As it seems a little out of order at the moment, I withdraw my motion.

Are there any other matters in the Report of the Council that the members wish to discuss? The President

Mr. Harkom.—A point that seems to have been overlooked in Mr. Jamieson's remark, is the placing of the nomination by the ten members, according to the privilege, on a separate list. This seems rather invidious. I think that the executive or whoever is responsible for putting out these lists, should bear in mind that the names nominated by the ten members have just as much right to be submitted to the Society as the others, without any distinction whatever.

That is mentioned in the By-law. The President

It is a matter that ought to be looked into. Mr. Harkom

This is on an old question. I agree with Dr. Galbraith that when a nomination is put out we ought to be informed as to the members nominated by the Committee and those nominated by others. The Committee may make a mistake, and we ought not to be obliged to turn back into the circulars to find it out. When the list is sent out, we ought to know what candidates are nominated by the Nominating Committee and who are named in the opposition. This is a point upon which I think we should have clear information. Mr. John Kennedy

There would be no objection to Mr. Kennedy's suggestion if each member of the Nominating Committee would get a vote from his own district for the nomination for that district. Then the names sent in by the members of the Nominating Committee can be put down along with the names proposed by others, should there be any, which is unlikely if that suggestion be adopted. If there are enough members in the district to nominate a third or fourth man, they surely can have the name inserted in the regular way. Mr. White

Do I understand that it is compulsory under the By-laws to put a ballot out in the manner indicated? Mr. Jamieson

The Secretary.—It is.

I would not interpret the By-laws in that way. Of course, that is easily covered by a special circular accompanying the ballot. Mr. Jamieson

It is in order now for a motion to adopt the report. The President

Mr. Mountain.—I move the adoption of the report.

I would like to know if this is a recommendation to the Nominating Committee for their consideration rather than an order which would have the effect of changing the By-laws. Mr. John Kennedy

The report reads "The Chairman of the Nominating Committee for Officers and Members of Council has suggested the following procedure for the conduct of the business of the Committees, and the Council has endorsed the same and recommends it to the Annual Meeting for its approval."

Mr. Chipman — Surely that does not empower us to change the By-laws of the Society?

The President — No, I do not think so.

Mr. Skaife — I would like to ask you if the fourth paragraph on page 15 of the Report of Council is under discussion.

The President — No, not at the moment. The matter will come up for discussion some time during the meeting, because an offer has been made for the property of the Society, and we will have to come to some decision.

Mr. Shanly — MR. SHANLY.—Is there anything in the By-laws that prescribes the mode of procedure by the Nominating Committee? There is a provision as to the appointment of the Nominating Committee, and the Committee is instructed to make certain nominations, but I understand there is nothing said as to how the nominations shall be made or what the procedure shall be.

The Secretary — That is right. The paragraph to which Mr. Jamieson referred reads as follows:—

"All nominations shall appear on the same ballot sheet and shall "be grouped separately, the list provided by the Nominating Com- "mittee being indicated as such, and any list submitted under By-law "38 shall give the names of the members making the nomination."

Mr. Jamieson — Well, that is distinct, but we shall have to change the By-laws.

The President — It has been moved by Mr. Mountain, seconded by Mr. Fairbairn, that the Report of Council be adopted.

Carried unanimously.

Mr. Shanly — Before proceeding I would like to ask another question, Mr. President. Are we to understand that the Nominating Committee is in future obliged to follow out that recommendation?

VOICES.—No, no.

The President — The next order of business is the Library and House Committee Report.

Mr. Mountain — I move the adoption of this report.

Mr. Shanly — I second the motion.

Carried.

The President — The Secretary will now read the financial report.

Mr. Tye — MR. TYE.—I remove that the report be adopted?

Mr. Duggan — MR. DUGGAN.—I second the motion.

Mr. St. George — MR. ST. GEORGE.—I would make an enquiry in regard to the value of our property. I see it has been kept at the same valuation practically every year, less depreciation. This is an advantage in regard to taxation, but if we want to borrow money in order to acquire a new building, we would not be able to do so.

The Secretary — The figure merely represents what the property has cost the Society, less an estimated depreciation.

I understand that the property is now sold or practically sold. The President

You have heard the motion of Mr. Tye, seconded by Mr. Duggan, that the financial report be received. What is your pleasure?

Carried.

The next order of business is the reports from the different branches. Mr. White will read the report of the Ottawa branch. The President

REPORT OF OTTAWA BRANCH FOR YEAR 1911.

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen,

The Managing Committee of the Ottawa Branch of the Society begs to submit the following report for the year 1911:

Membership.—Total membership of this Branch at the close of the year was 261, of which 3 were Honorary Members, 52 Members, 100 Associate Members, 2 Juniors, 75 Students, 29 Ottawa Branch Associates. This is a decrease of one Honorary Member, an increase of 5 Members, 12 Associate Members, 2 Juniors, 7 Students, 9 Ottawa Branch Associates, and a decrease of one Associate Main Society, making a total increase since our last report of 33 or 12½%.

Annual Meeting.—The Annual Meeting of the Branch was held on the 5th October, and the following officers were elected for the year 1911-12:

Chairman—S. J. Chapleau.

Secretary-Treasurer—H. Victor Brayley.

Managing Committee—Noulan Cauchon, R. de B. Corriveau, Geo. J. Desbarats, John Murphy, R. F. Uniacke.

At a meeting of the Managing Committee, their work was divided into 5 sub-committees, with one of their number as Chairman of each sub-committee, as follows:

Entertainment—John Murphy, Chairman; W. J. Dick, M. Donaldson, W. A. Duff, A. B. Lambe.

Library—Geo. J. Desbarats, Chairman; M. F. Cochrane, F. J.

Delaute, B. H. Fraser, John B. Harvey.
Papers—R. F. Uniacke, Chairman; C. R. Coutlee, G. B. Dodge.
Press—Noulan Cauchon.
Rooms Committee—R. de B. Corriveau, Chairman; M. F. Cochrane, Louis E. Cote, G. Gordon Gale, Arthur Nowlan.

Mr. Desbarats resigned from the Managing Committee and Chairman of the Library Committee on the 14th December, owing to not having the time at his disposal for the work attached to their offices; his resignation was accepted on the 27th December at a meeting of the Branch, and later Mr. F. J. Delaute was elected to take his place in these Committees.

At a meeting of the Branch on the 20th December, Mr. R. F. Uniacke, a Member of the Managing Committee, was chosen Vice-Chairman of the Branch.

Meetings.—The following papers, lectures, etc., were given during the year:

Wednesday, January 4th, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Mr. D. H. Nelles, A. M. Can. Soc. C.E., on "International Boundary Survey."

Wednesday, January 18th, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Dr. P. H. Bryce, Associate Ottawa Branch, on "The Hypochlorite Treatment of Potable Water."

Wednesday, 8th February, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Mr. Alex. Gray, A. M. Can. Soc. C.E., on "The Grand Trunk Terminals at Ottawa."

Wednesday, 15th February, Mr. Noulan Cauchon, A. M. Can. Soc. C.E., in the chair. Paper by Mr. A. St. Laurent, M. Can. Soc. C.E., on "The Construction of Grain Elevators."

Wednesday, 22nd February, Mr. James White, M. Can. Soc. C.E., in the chair. Paper by Engineer Commander P. C. W Howe, R.N., Associate of Ottawa Branch, on "Big Cranes."

Wednesday, 8th March, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Mr. Samuel Bray, M. Can. Soc. C.E., on "Silver Mining in Mexico, in the Days of the Spaniards."

Wednesday, 15th March, Mr. James White, M. Can. Soc. C.E., in the chair. Paper by Mr. W. J. Dick, Associate Ottawa Branch, now A. M. Can. Soc. C.E., on "The Drainage System and Topography of Canada."

Wednesday, 22nd March, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Mr. Ormond Higman, M. Can. Soc. C.E., on "The Standards of Electrical Measure." Delivered in the Electrical Laboratory of the Department of Inland Revenue.

Wednesday, 29th March, Mr. R. F. Uniacke, M. Can. Soc. C.E., in the chair. Paper by Mr. F. D. Ross, A. M. Can. Soc. C.E., on "Inspection."

Wednesday, 12th April, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Paper by Mr. F. W. Prentice, Inventor Wireless Trains Control, on the subject of his invention.

Wednesday, 25th October, Mr. S. J. Chapleau, M. Can. Soc. C.E., in the chair. Paper by Mr. Noulan Cauchon, A. M. Can. Soc. C.E., on "Town Planning."

Wednesday, 1st November, Mr. S. J. Chapleau, M.Can. Soc. C.E., in the chair. Paper by Mr. C. R. Coutlee, M. Can. Soc. C.E., on "Wheat, its Early History, Transportation and Trade of the Present Day."

Wednesday, 15th November, Mr. S. J. Chapleau, M. Can. Soc. C.E., in the chair. Paper by Mr. Alex. Fleming, Associate Ottawa Branch, on "Cement Testing from the Manufacturer's Point of View, as compared to the Consumer's." Mr. Fleming is Chemist for the Canada Cement Company's Mill at Hull, Que.

Wednesday, 6th December, Mr. Noulan Cauchon, A. M. Can. Soc. C.E., in the chair. Paper by Lt.-Col. G. S. Maunsell, R.C.E., A. M. Can. Soc. C.E., on "The Progress made in Aeronautics during the past year."

Wednesday, 20th December, Mr. John Murphy, M. Can. Soc. C.E., in the chair. Paper by Mr. R. F. Uniacke, M. Can. Soc. C.E., on "The Design and Construction of the Little Salmon River Viaduct, National Transcontinental Railway."

Business Meetings.—Wednesday, 8th November, Mr. R. F. Uniacke, M. Can. Soc. C.E., in the chair. This meeting was called to continue the discussion on matters arising from Mr. Cauchon's paper on "Town Planning," given on the 25th October, as pertaining to Town Planning for the City of Ottawa. The following resolution was carried, being moved by Mr. Geo. A. Mountain, seconded by Mr. Basil Fraser:

RESOLVED:—"That the Ottawa Branch, Canadian Society of Civil Engineers, place itself on record as being in favor of any steps that may be the means of securing proper and scientific planning of this city and suburbs, for its future development, and that the following committee of five be appointed to further this end: Dr. P. H. Bryce, Newton J. Ker, A. A. Dion, James White, R. W. Farley."

At a meeting of the Committee, Mr. James White was elected Chairman. This Committee is still in executive session.

Wednesday, 22nd November, Mr. Noulan Cauchon, A. M. Can. Soc. C.E., in the chair. This meeting was called on the request of Mr. A. St. Laurent, M. Can. Soc. C.E., to consider the ways and means of impressing upon the Government of Canada the importance of having official invitation sent to the Members of the 12th International Congress of Navigation to be held at Philadelphia, in June, 1912, to visit Canada after their meeting.

The following Committee was elected to report on programmes, trips, cost of same, etc., at a meeting of 29th November: Mr. St. Laurent, Chairman, Lt.-Col. W. P. Anderson, Messrs, C. R. Coutlee, James White, Geo. A. Mountain, A. A. Dion, John Murphy, W. J. Stewart.

Wednesday, 29th November, Mr. A. A. Dion, M. Can. Soc. C.E., in the chair. Business: "Inviting 12th International Congress of Navigation, to be held at Philadelphia, in June, 1912, to visit Canada after their meeting." The following motion was carried:

Moved by Mr. U. Valiquet, seconded by Mr. Alex. Gray:

"That Ottawa Members of Council place before Council at next meeting (December 9th), proposed invitation of Members of the 12th International Congress and ask the Council's assistance in furthering this matter."

Wednesday, 27th December, Mr. R. F. Uniacke, M. Can. Soc.C.E., in the chair. This meeting was called to discuss the City of Ottawa Water Question. The following motion was carried:

Moved by Mr. John Murphy, seconded by Mr. James White, that:

1. Whereas the necessity of securing a constant supply of pure water for the City of Ottawa has, for many years, been the subject of public discussion, and,
2. Whereas this Ottawa Branch of the Can. Soc. C.E. recognizes that the obtaining of such a supply of pure water is a matter of the utmost importance to the Citizens of Ottawa, and,
3. Whereas, in the opinion of this meeting, the adoption of the McGregor Lake Scheme may defeat—or delay for an indefinite length of time—the securing of an abundant supply of pure water, be it, and it is hereby resolved:

(a) That in view of the facts contained in the Report of the Pure Water Commission, dated November 25th, 1911, showing that the proposed McGregor Lake Water Supply scheme has not been thoroughly developed, and, as there is no proof otherwise that such supply would be adequate for the city's needs, it is in the best interests to defeat the proposal, and,

(b) That on account of the never-failing supply of pure water which, in the opinion of this meeting, may with proper handling always be obtained from the Ottawa River, the Corporation and Officials of the City of Ottawa for the year 1912 are hereby strongly urged to deal expeditiously with the question of improving the Ottawa River supply, and,

(c) That this meeting hereby places itself on record as protesting against the horrible practice of discharging raw sewage into rivers and streams, and,

(d) That the Secretary be and he is hereby directed to send copies of this resolution to the Dominion Government, to the Provincial Governments of Ontario and Quebec, to the Corporations of Ottawa and Hull, and to the Press of these cities.

Entertainments.—February 1st, an Informal Dinner was held at the King George Hotel.

November 18th. Trip over the newly constructed works of the Grand Trunk Railway at Ottawa, composing Power House Station, "Chateau Laurier" Hotel, etc. Previous to the trip a luncheon was held in the New Russell Hotel.

Attendance.—Attendance at the meetings has increased over the previous year, averaging 36. The interest taken in the Branch and the Society is on the increase. It is noticed that Members of the Society in Ottawa are better acquainted. The Branch has succeeded in bringing members in closer touch with one another on matters pertaining to the profession, and socially. Before this Branch was started a great number of members of the Society in Ottawa were strangers to one another. In this matter the Branch has been the means of bringing about this very desirable end.

Finance.—The Branch has received $450.00 on account of refunds and almost cleared off their deficit, owing largely to the increase in refunds, but it has been hard financing during the last year, and strict economy had to be enforced. With the increase in number of members and interest in Society matters, the revenue only covers about half what is required to have the Branch operated as it should be.

The change in By-laws giving the Branch larger refunds has been of great assistance, and the thanks of the Branch is tendered to the Secretary of the Main Society in making refunds quarterly on request of the Branch. We regret to notice the amendment to By-Law No. 55 submitted to the members of the Society to be voted on at the Annual Meeting. If this amendment was in force the past year, the loss in revenue to the Branch would be over 10%.

Rooms (Headquarters).—The rooms of the Branch appeared small a year ago and at present are not large enough for ordinary meetings. A sub-committee on rooms, Mr. R. de B. Corriveau, Chairman, and a member of the Managing Committee, are now working out plans for quarters more suited to our needs. It is found that the cost of new quarters and their upkeep will be over double our present expenditure.

We are glad to note the names of visiting members on our register, and hope every member visiting Ottawa will be able to call at our headquarters and register. This year we have installed a telephone, and a card index, open to all members of the Can. Soc. C.E., where will be found the name of every member of the Ottawa Branch, with office, house address, and telephone number. The rooms are open daily, and it will be found a place where visiting members can transact their corresppondence, etc., undisturbed. We are only too pleased to meet visiting members and have them become personally acquainted with the Ottawa Branch members.

Library.—Our library has not been increased during the last year. A better library is badly needed, but until we get more assistance there cannot be much improvement made. There is a strong Committee, headed by Mr. F. J. Delaute, Chairman, and a member of the Managing Committee, working on some way of improving the library, and outlining the plans for the necessary library required for our members.

Papers.—We are pleased to note that Council will now permit papers read at Branches to be published in the *Transactions*, it being not necessary now for them to be read previously in Montreal. We will submit papers to Council at an early date for their approval for publication in the *Transactions*. Our Sub-Committee, Mr. R. F. Uniacke, Chairman, and a member of the Managing Committee, are now working on this matter.

Nomination Committee.—Mr. James White was the representative of the Ottawa Branch on this Committee for the year, being elected by letter ballot by the Branch and accepted at the last Annual Meeting to represent District No. 4 on the Nomination Committee. The Managing Committee had intended to have the Branch suggest four names of members to their representative on the Nomination Committee, but owing to the absence of the Chairman and the Secretary at the time required for a letter ballot, it was not carried out. A letter ballot was taken on the 27th December for election of the representative of the Ottawa Branch on the Nomination Committee for the coming year. Mr. James White is again the choice of the Ottawa Branch. We trust the Annual Meeting will elect him to represent District No. 4 on the Nomination Committee.

By-Laws.—The By-Laws of the Branch were changed at the

Annual Meeting last year to conform with the By-Laws of the Main Society, which had been altered during the year.

We, the Managing Committee of the Ottawa Branch, beg to suggest that the following matters be taken up at the Annual Meeting and trust that some improvements may be made along the lines suggested.

That the published By-Laws and List of Members for 1912 and thereafter contain the By-Laws of each Branch. That the names of Members be grouped under the District or Branch of which they are resident, in a manner similar to the lists of the American Society of Civil Engineers; or that opposite each name on the alphabetical list some abbreviation be used to denote the Branch or District of which the member is a resident and also that the Council give the Secretary the necessary assistance to have this work carried out.

Library.—That some means be arranged so as to assist Branches in building up local libraries with all the subscriptions for periodicals handled from headquarters of the Society.

Finance.—That the refunds to Branches will not be decreased in proportion to that due for the past year, and also that the refunds on the members will be increased as soon as the finances of the Society will warrant.

Members.—That students shall not remain in that class after January, 1913, if they are over 23 years of age, as called for in the By-Laws.

That the Secretary be instructed to notify the Branches of changes in address of members pertaining to their Branch when received, and that the Council arrange sufficient assistance to be given the Secretary to carry out this work.

All of which is respectfully submitted.

S. J. CHAPLEAU, *Chairman.*
H. V. BRAYLEY, *Secretary.*

TREASURER'S REPORT FOR 1910-11.
(Ottawa Branch.)
1st October, 1910, to 1st October, 1911.

Revenue.

Subscription ($2.50) towards furnishing rooms	$60.00
Fees from Ottawa Associates	38.00
Refunds from Head Office	384.00
Other Sources	10.00
	$492.00
Cash on hand, October 1st, 1910	46.37
	$538.37

Expenditure.

Towards furnishing rooms	$107.10
Rent	204.00
Light	45.72
Correspondence, postage, etc.	105.85
Library	9.06
Caretaker	60.00
Sundries	2.15
	$533.88
Cash on hand, October 1st, 1911	4.49
	$538.37

A Member May I ask if it is the intention that the papers from the Branches be inserted in the general *Transactions* of the Society?

The Secretary The arrangement made at the meeting in Winnipeg was that papers read by a Branch should be approved of by the Committee on Papers before appearing in the *Transactions*.

The President Will a member move the adoption of the report of the Ottawa Branch?

Mr. S. J. Chapleau.—I move the adoption of this report.

Mr. Stewart.—I second the motion.

Carried.

The Report of the Toronto Branch was read by Professor Haultain.

Annual Report of the Toronto Branch,

Canadian Society of Civil Engineers.

The Executive of the Toronto Branch of the Canadian Society of Civil Engineers, in presenting their report for the year 1911, are pleased to state that this year has been a successful one.

We regret to record the death of James Wilson, an active member of the Branch.

In July, our Secretary, Mr. A. C. D. Blanchard, moved to Lethbridge, Alta., and his removal was very much regretted by the Society.

At the commencement of the year, the Engineer's Club of Toronto was reorganized, making it both a Technical and Social Club, and as many of our members are members of the club, and as the Society rooms are located in the club quarters, naturally the Society has benefitted.

The Engineer's Club has undertaken to complete the cataloguing of our library and has arranged for a librarian.

The regular monthly meetings of the Society have had the average attendance, but we must add that we find great difficulty in securing engineers to address the meetings.

The Toronto Branch is of the opinion that the following changes in the method of operating certain sections of the Society's work would be advantageous.

(1) That annual membership cards be issued to members of the Society in good standing, for presentation on demand not only at the Head Office of the Society, but at the Branch Societies.

(2) That in the list of members published by the parent Society, the Branch to which each member is connected be indicated.

(3) That the Permanent Secretary of the Society visit at least once a year the Branch Society, meeting the executive and making an inventory in conjunction with the Secretary of the Branch of the property of the Society at that Branch.

We commend the action of the parent Society in compiling and publishing standard specifications, and we suggest that this work be extended and a certain amount of advertising be done so that engineers may know what specifications they may secure, at what price, and in this way learn what the Society is doing.

All of which is respectfully submitted.

H. E. T. HAULTAIN,
Chairman.

E. A. JAMES,
Secretary.

Is it your pleasure, gentlemen, that this report be received? **The President**

I move that we receive the report and that the recommendations contained therein be referred to the incoming Council. **Mr. Vaughan**

I second the motion. **Mr. Haultain**

Carried.

The Secretary read the report for the Manitoba Branch.

REPORT OF THE MANITOBA BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS FOR THE YEAR 1911.

The Manitoba Branch of the Canadian Society of Civil Engineers begs leave to submit the following annual report for the year 1911:

Officers.—The officers for the year 1911 were as follows:

Chairman—C. H. Dancer.
Executive Committee—J. A. Hesketh, E. P. Fetherstonhaugh, T. Turnbull.
Secretary-Treasurer—E. Brydone-Jack.

Meetings.—The following papers were discussed at the regular meetings of the Branch:

November 3rd, 1910, "Development in the Canadian West During the Last Five Years," by the late J. E. Schwitzer.
January 5th, 1911, "Main Factors Governing the Selection of Motors," by E. P. Fetherstonhaugh.
February 2nd, 1911, "Hydro-Electric Power Plant for the City of Winnipeg," by W. G. Chace.
March 2nd, 1911.—Discussion on above paper.
April 6th, 1911, "The Hudson Bay Railway," by John Armstrong.

The attendance at these meetings averaged 32.

Officers for 1912.—At the annual meeting of the Branch held December 7th, 1911, the following officers were elected:

Chairman—J. A. Hesketh.
Executive Committee—W. A. Duff, E. P. Fetherstonhaugh, J. G. LeGrand, W. L. Mackenzie, and C. H. Dancer (retiring chairman).
Secretary-Treasurer—E. Brydone-Jack.

Restpectfully submitted,

E. BRYDONE-JACK,
Sec.-Treas.

MR. LEGRAND.—I wish to make the same motion as made by Mr. Vaughan, that this report and its recommendations be received and referred to the incoming Council.

Carried.

The Secretary read the report of the Kingston Branch.

C. H. McLeod,
Secretary Can. Soc. C. E.

Replying to your favor of January 12th, asking for a report on the work of the Kingston Branch, I may say that there is nothing of particular importance to report. This Branch has been very re-

cently organized, and the number of members in the territory covered by the Branch is rather small for effective work. In time, however, we hope to arouse a little more interest in the work. Since organization several meetings have been held, at which informal talks have been given, followed by some discussion.

The Secretary has endeavoured to induce members to prepare papers for presentation to the Society, with the result that several papers are in course of preparation, and will be available within the next few months.

Yours truly,

L. W. GILL,
Secretary, Kingston Branch.

MR. LINDSAY.—I move that this report be received.

Carried.

The report of the Quebec Branch was read by Mr. Baillairgé.

REPORT ON THE ANNUAL PROCEEDINGS OF THE QUEBEC BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS FOR THE YEAR 1911.

We have the honour to report that since the last Annual Meeting on the 19th January, 1911, the Quebec Branch of the Canadian Society of Civil Engineers has held nine meetings for the transaction of general business and the election of officers.

The Branch has now a membership of 63 members, viz.:—50 Members, 11 Students and 2 Associates, being an increase of 5 members and 7 students over last year.

Although no papers were read at any of the meetings, interesting discussions took place upon subjects relating to the profession, such as winter navigation on the St. Lawrence, the question of "What Constitutes a Navigable River," etc.

The Society still continues to occupy the comfortable room in the City Hall kindly placed at its disposal by the municipal authorities.

At the last Annual Meeting of the Branch, Mr. W. D. Baillairgé, City Engineer of the City of Quebec, was unanimously elected Chairman for the coming year, and Mr. Arthur Amos, Hydraulic Engineer of the Provincial Government, Secretary-Treasurer of the Branch. The Councillors for the coming year are A. R. Décary, re-elected; Messrs. C. J. Pigot and J. F. Guay to replace W. R. Russell and R. O. Sweezy.

P. E. PARENT,
Past Chairman.

Quebec, 5th February, 1912.

MR. BAILLAIRGE.—I move the reception of this report.

The motion was seconded by Mr. Parent and carried.

The President The Council reports the award of the Gzowski Medal to Mr. W. G. Chace, Associate Member of the Canadian Society of Civil Engineers for his paper on "Municipal Hydro-Electric Works for the City of Winnipeg," on the recommendation of the Committee.

The meeting adjourned at 1 p.m.

AFTERNOON SESSION, JANUARY 24TH, 1912.

The President Gentlemen, we will take up the report of the various Committees.

The first report is that of the Committee on Roadbed and Ballasting. Mr. Sullivan is the Chairman of that Committee, but is not present.

Mr. White, the Chairman of the Committee on Conservation, will present his report.

Dr. Galbraith I would suggest, Mr. President, that these reports be taken as read, and that we immediately proceed with the discussion of them.

The President Is that your pleasure, gentlemen?

Carried.

The President Is there any discussion on the report of the Conservation Committee, which has just been read by Mr. White?

The President MR. C. H. MITCHELL.—I must say that we should consider ourselves very fortunate in having Mr. White as Chairman of the Conservation Committee. There is evidently a great deal of work which it was expected would be done by the Committee of the Society, that is now being done by the National Commission. There are some conditions which Mr. White's report has opened up to us, that would be interesting to the Society if they were followed up by Mr. White's Committee, with perhaps a little more detail than that given in the report of the National Commission, or in such reports as have already been published. The fuel question is one that I have particularly in mind. In this country we are dependent—at any rate, the central portion of Canada is dependent,—on a foreign country for its fuel supply. It would be opportune for the Society to make a special study of the possibilities of developing the fuel supplies in the central portion of Canada. I have no doubt the National Commission has that prominently before it, but I make this suggestion in order that the members of our Society may have this question before them, and may perhaps be able to assist the National Committee in that respect.

Another important matter is that of the water powers. The National Commission, as far as I can gather, and as Mr. White has indicated, is touching only the general details in respect to the water powers. There are some features of our Canadian water powers which perhaps would fall more particularly under the purview of the Committee of our Society,—such as, for instance, the study of winter conditions in our power development, the action of ice, the conservation of power with respect to ice troubles, and other similar matters.

MR. LEOFRED.—I understand that the report of the Conservation Committee as read by Mr. White is not the report of this Conservation Committee at all. It is the report of Mr. White as Secretary of the Conservation Commission appointed by the Dominion Government, but I see there have been nineteen engineers who are members of this Society appointed to form a Committee. They were supposed to do something in connection with the conservation of the natural resources of the Dominion, and the only thing they say as an excuse is that Mr. White has been appointed Chairman only in November. They do not say why those nineteen members who have been appointed more than a year ago, have not done anything at all. I appreciate very much the report of Mr. White as Secretary of the Conservation Commission. I wish his report could be considered the report of the Committee of the Canadian Society of Civil Engineers on Conservation.

Are there any of the noble nineteen here? **The President**

MR. MOUNTAIN.—In all fairness to that Committee, Mr. President, and I think Mr. White will bear me out, the previous Chairman, Mr. Coutlée, did a large amount of work in connection with this Commission before he turned it over to Mr. White.

In regard to what has been said about the immortal nineteen, I **Mr. White** was appointed Chairman in November. Mr. Coutlée was appointed Chairman before the last Annual Meeting, and if any one will refer to the report of last year they will see that he handed in some very valuable matter from the Committee. Obviously, I was not able in the short space of time since my appointment to hand in an extended report, and since the organization of the Committee I have discovered the difficulty in deciding exactly what the Committee should do. Circulars were sent to each Member, Associate Member, and Student Member of the Society, requesting them to furnish information in respect to water powers, the discharge, and anything of that nature. We received in reply a large amount of valuable information. I have come to the conclusion that the Committee can largely serve as a means of propaganda, and for that reason I am supplying copies of all our reports to the members of the Committee

and to the members of the Society. I would like to suggest that the members of the Committee address the various branches throughout the country and give talks based on the information which can be supplied by the Commission. The average member of the Society cannot go through a report from cover to cover in order to get a full and complete idea of its contents, and if the Committee would adopt my suggestion, I think we would have succeeded in doing a great deal.

This question of conservation is really a very old one—the only novelty is its name. Every engineer who utilizes an extra foot of fall in water power, or who reduces a grade, is a conservationist of a very practical character. All we are trying to do is to formulate in a definite way the basic principle of conservation and endeavouring to wake people up to the necessity of conserving our natural resources so as to get the maximum benefit from them, during their exploitation.

There is a great deal more which might be said on the subject, of course, but we have so much business to go on with, this afternoon, that I trust this explanation will be sufficient for Mr. Leofred.

The President — We will now take up the report of the Committee on Ties.

Mr. Holgate — MR. HOLGATE.—There is nothing, Mr. President, that I would like to add to the report.

Mr. Mountain — That does not mean, I presume, that the report is not open for discussion.

The President — Certainly it is open for discussion.

Mr. Mountain — The matter of the length of ties was largely discussed in committee. The question of long ties over bogs and places of that kind is an important one, and there is another question also as to the ordinary length of ties. I don't know whether the Committee means that the length of the tie generally should be ten feet.

The President — No, there is no recommendation. Just the correspondence.

Mr. Mountain — I would suggest that the discussion of the report of the Good Roads Committee be deferred until Mr. Campbell's arrival on Friday morning.

The President — Are there any other members of that Committee present? If not, is it your pleasure to leave this report over until Friday until Mr. Campbell is present?

Carried.

The President — Next is the report of the Committee on the Establishment of Testing Laboratories, of which Mr. Keefer is the Chairman.

Mr. Keefer — MR. KEEFER.—Mr. President and gentlemen, there is very little to add to the report which under the circumstances is the only one we could present. On account of the change of Government and the appointment of a new Minister, it is very difficult for him to give

his attention to these matters at the moment. In answer to a request from Council, I had a very brief interview with the Minister of Public Works some time ago. I wrote him later asking for an appointment, as he was very busy at the time, and have received the following letter in reply, which I think expresses his views of the matter:

January 9th, 1912.

C. H. Keefer, Esq.,
Consulting Engineer,
Metcalfe Street, Ottawa.

"Dear Sir,—I have received your letter of the 5th instant, con-
"cerning the establishment of a Testing Laboratory by the Govern-
"ment at Ottawa."

"I am afraid it will be difficult for the Government to take up "this important matter during the present session, because of our "numerous engagements upon assuming office just on the eve of "meeting of Parliament. As soon, however, as the Parliament ad-
"journs, I will gladly take up this matter with you, and I feel con-
"fident that upon a proper examination the Government will favor-
"ably consider the establishment referred to in your letter."

Believe me, dear sir,
Yours very truly,
(Signed) F. D. MONK.

It seems to me, Mr. President, from this letter of the Minister, that he is in sympathy with us. It will take some time, but I think there is every prospect that eventually something will be done towards the establishment of Testing Laboratories. There is no chance of it being done this session, but evidently the Minister will take the matter up later when he has more time at his disposal.

I would ask in connection with Mr. Keefer's statement, if any definite recommendation has been made by this Society to the Government, or if the Committee has made up its mind what to recommend to the Government in the way of a Testing Laboratory. Mr. Holgate

Our request to the previous Government was for testing laboratories constructed and operated by the Government. We asked to have a laboratory similar to those established by the American Government, and that the Government's engineers should examine and report on the American Government's testing laboratories, and then arrange for the establishment of similar ones on a smaller scale in Canada. As you will see by our reports the Minister of Public Works in the late Government took the matter up, and Mr. Keefer

sent officers of his department to visit the American laboratories. They have given us full information and made a report, and they recommended that a certain sum be put in the estimates for the establishment of these laboratories. This, I believe, has not been done yet, but we have not recommended any special plan ourselves.

Mr. Holgate — How can this Society assist or promote the establishment of these testing laboratories?

Mr. Keefer — Our object was to draw the attention of the Government to the necessity for them. We thought the Government was using such large quantities of materials in this work that it might carry it out on a larger scale than any institution or individuals, and that the information it would obtain would be a benefit to the profession at large.

Mr. Duggan — Mr. President, I would like to suggest that if the Society is going to take action in the matter of establishing a Testing Laboratory, that it should be on a scale that would be of use to Canadian engineers generally. Our Universities and a good many large contracting firms have testing laboratories of one kind or another, and the larger Universities are well equipped for testing up to 75 or 100 tons, so that there does not seem to be any occasion for the establishment of a testing laboratory unless it is on a very much larger scale than those already existing of private individuals or institutions of learning. We have instances now before us, in connection with the Quebec Bridge, for which heavy tests must be made in the United States, and it seems to me that if we are to have a testing machine of any use, it should be one of at least 1,000 tons capacity instead of such as quoted in the report of 200 tons capacity. In other words, it does not seem to be worth while to get the Government to establish a laboratory which would simply duplicate existing ones. I think, Mr. President, there ought to be some definite recommendations to the Government rather than a mere request to establish a Testing Laboratory.

Mr. Keefer — I might say in reference to Mr. Duggan's remarks that the Committee recognized the necessity of having something much larger than existing laboratories, and our idea was to establish a laboratory of as great a capacity as possible; but we did not feel that we could dictate what that capacity should be.

Mr. Harkom.—I happen to be in somewhat close touch with the Executive of the Canadian Manufacturers' Association, and I brought this matter to their attention lately with the idea that perhaps this meeting might suggest that our Council work in harmony with the Council of the Canadian Manufacturers' Association. The laboratory with which this report deals is an exceptional one, but there are a very great number of manufacturers in the country who

would be benefited by it, and there are also a very great number who would like to see something more general than that. I am able to say that if this Society sees fit to co-operate with the Canadian Manufacturers' Association, in all probability we will get better results in approaching the Dominion Government by recommending the establishment of a general testing laboratory similar to the laboratory established near Berlin in Germany, which has had a great deal to do with the rapid advancement in German manufactures. It is possible to have any material used in manufacturing, tested at this laboratory, which was established by the Government and reports from it are treated by the Courts as authoritative. Quite recently in a rather important matter I had before me for consideration, there were certain reports, analyses and tests submitted, varying to such an extent that it was impossible to form a really satisfactory opinion on the matter. Now, if this Society can join hands with such an Association as the Canadian Manufacturers, which is recognized as being rather an influential one in the country, and if we could also get the co-operation of some other societies, we would stand a far better chance of getting what we want, than by approaching the Government single-handed as we have done in the past. If I am in order, I would move that the Executive or a Special Committee of this Society be instructed to co-operate with other bodies in bringing the attention of the Dominion Government to the desirability of establishing a National General Testing Laboratory.

I second the motion. Mr. Skaife

I am afraid I was not very clear in my statements. We already Mr. Duggan have a number of laboratories such as Mr. Harkom speaks of. The universities and large contractors as well have testing machines for testing cement, and there are commercial concerns which make analyses and tests. What I supposed this Society had in view, was the installation of testing machines such as are not to be found in this country, and are beyond the reach of any private corporation or institution of learning. The cost of the installation of these machines is much too great for a University, or, indeed, for any corporation. The Dominion Bridge Company has a 75-ton testing machine, and McGill University has two of about the same capacity, and there is no reason why testing of that class cannot be done in a number of places in Canada, but it ought not to be necessary to go to the United States or elsewhere in order to get our heavy testing done, as we have to do at present.

It was simply to suggest the lines on which we should approach the Government to get it started, that I brought this matter up. My own views are quite opposed to Mr. Harkom's in this respect. I

think we should try to get machines which cannot be got otherwise rather than to establish a general testing bureau.

Mr. Jamieson — As a member of that Committee, although I have not taken a great part in its work, I attended several meetings in Ottawa when we first took the matter up with the Government. The purpose of the Committee was to impress upon the Government the necessity of putting in large machines—larger than those at present available or owned by the different universities and testing firms in this country, and in other respects to co-operate with the universities in Canada to utilize their testing appliances wherever possible. We tried to impress them with that fact at the time, but progress was slow, and they had to go through the ordinary method of appointing somebody to investigate. Unless we can get the Government to realize the importance of this matter and the magnitude of the work, namely, the installing of a sufficient number of large machines, and the appointment of proper men in charge of them, we will not accomplish our object. Probably it will all have to be taken up again with the new Minister, and I think the points we wish to have considered might again be impressed upon the Government as strongly as possible.

Mr. Keefer — If we can get the co-operation of the Manufacturers' Association and other bodies to draw the attention of the Government to the necessity of the establishment of a laboratory with very full equipment and the largest possible machines for testing all classes of materials, it will be a very good thing and strengthen our position very much.

Mr. John Kennedy — I think, Mr. President, that Mr. Duggan has touched upon the fundamental question. It seems within the province of this Society to make a recommendation to the Government, not merely for the establishment of some sort of a testing laboratory, but to make a definite recommendation as to what is needed. I cannot recall what this Committee was empowered to do; that is if it was empowered to go to the Government simply to ask for a laboratory, but I think its instructions might be enlarged, and that it would be safer for the Committee to get information and report to the Society before a definite recommendation is made.

Mr. Jamieson — I might say that the Committee will welcome suggestions from any members of the Society on this matter. Personally I think we should go further than testing and that arrangements should be made for special research work. It is to this feature that the great degree of success which has been attained in other countries is due.

Mr. Harkom — The resolution I have offered is not intended in any way to hamper the Committee in its work for the Society, but simply to authorize it to co-operate with other bodies. Concerted action

of that description would be far more likely to lead to good results than individual efforts by the Society itself or by others.

The President: You have heard the resolution proposed by Mr. Harkom that the Council or a Special Committee of the Society be authorized to co-operate with other bodies in bringing to the notice of the Government of Canada the desirability of establishing a Dominion General Testing Laboratory. What is your pleasure, gentlemen?

Mr. Duggan: I would like to move an amendment, Mr. Chairman, to that resolution, namely, that the Committee be instructed to request the Government to establish a testing machine of not less than one thousand tons capacity, and that they confer with representatives of other bodies to accomplish this and to establish such other testing machines as may be decided upon, and that they be authorized to co-operate with other bodies.

Mr. St. George: How long do you think this will take? The Committee on Testing Laboratories has been established since 1909. I think if you have some platform to work on in suggesting that the Government establish larger testing machines than we have to-day, you should give them an estimate of what it is going to cost.

Mr. Duggan: The idea was to give the Committee definite lines to work on.

Dr. Galbraith: Mr. President, I feel a little doubtful at this time about deciding on the size of a testing machine. Persons accustomed to make bridge tests and other tests have very different ideas on the subject, and before making a proposition of that kind to the Government there ought to be an opportunity given to the Society to find out its own views.

One of the biggest bridges in the world—the Forth Bridge—was built without the use of any large testing machines. I have assisted in making tests on the largest American machines, and I do not feel at all convinced that tests of that magnitude are necessary. Certainly if the machines exist it is well to use them, for they are more satisfactory than smaller machines. If you could make a machine that would break a fully constructed bridge, it would give you a good deal more information than you could otherwise have about that bridge. That, however, is hardly the point. The scientific engineer has to design the largest structures from a knowledge of the properties of material and of smaller structures.

The Commission on the Quebec Bridge Inquiry received some very enlightening letters from the late Professor Kernot, who was connected with the bridge department of one of the Australian States. He made experiments after the Quebec Bridge disaster, building up compression pieces with pasteboard and glue, and derived from these experiments proportions which seemed to be far in advance of those that existed in the large compression members of the Quebec Bridge.

Sir Benjamin Baker is said to have made experiments with stove pipes in deciding upon the form of the girders for the Forth Bridge. There is a great deal of work of that kind to be done and we should make and test models of various proportions, but we are not doing so simply because we have these great testing machines in the United States. We would know more about the behaviour of built up compression members if we were forced to make experiments with models—I do not mean models, for instance, for the Quebec Bridge of one-third size, which was the largest model that could be broken in the machine that was used at the Phœnix Bridge Works, and which, on the other hand, was the largest model that would give a rivet of reasonable size. We can do with machines much smaller than the 1,200-ton machine that was used there, and by not attending to the rivetting proportions, but putting in an over-proportion, so to speak, of strength in the lattice work, we could make experiments in which most engineers would have a great deal of confidence. I am sure that, while it is convenient to have a big machine, there are many engineers in the United States, as well as in Great Britain and on the continent, who would not agree with the idea that a machine that will break full-size members is necessary. I should like to see this question discussed a little more fully before we make a proposition to the Government. We might in the end come to Mr. Duggan's conclusion. It is a question that is well worth considering before passing a resolution which practically says that the Civil Engineers' Society has made up its mind on the subject.

Mr. Thomson

Dr. Galbraith has referred to the Quebec Bridge, and I would like to say that if getting very large testing machines is going to result in a repetition of the design of column that caused the old Quebec Bridge disaster, we had better not have them. This reference to the Quebec Bridge recalls some correspondence with one of our principal engineering papers, where it was contended that engineers did not know how to design large columns. I sent them a reference to a column they had described some twelve years previously, for a twelve-hundred foot span of my own design, which I thought would stand the strain. The editors said that while Thomson evidently had designed a column that would have stood, they doubted very much if he could say why or how he did it. One simple rule, "to make the column equally strong in every direction," would have saved that bridge.

The chief objection to these testing machines is that they test a small section of a column and then it is attempted to enlarge that, using lattice parts where they have no business to use them.

Mr Duggan

I am afraid if we go in to the actual necessity of size of testing members, we might continue the discussion all afternoon. Dr. Galbraith, Mr. Thomson and I have evidently quite divergent views on the subject.

The statement in the "Engineering Press" referred to by Mr. Thomson has been to some extent borne out by later tests, and I think a good many engineers have been rather surprised at the low ultimate strength shown by some columns in large size tests. It is true that if we are to get real light on the question, careful experiments such as those carried out by Major Howard and Professor Talbot must be resorted to rather than the mere testing to destruction of large size members. For some sections these analyses can be made on comparatively small machines, but few of the members in large structures can be represented by these simple sections, and we must either draw deductions from very dissimilar forms or from model members which are reproductions of the originals on a very much smaller scale.

There are a great many objections to the latter procedure, an important one being that the results then obtained are likely to be very unreliable and but a poor guide to what may be expected in practice, because the thin component parts of a member apparently have their elastic limits raised by cold rolling; the rivets to be on a comparative scale have in some cases to be as small as ⅜" diameter and the process of making these members, from the very nature of the work, cannot conform to the ordinary shop practices. I do not think that we need a machine of sufficient capacity to test a chord of the Quebec Bridge or of any other exceptionally large structure, but I do think it is important that the machine should have strength enough and sufficient length to test members that can be built up of commercial sizes by commercial methods, of approximately the same character as the section to be investigated.

Mr. Monsarrat has just suggested to me that I should not confine my remarks to compression members but refer also to the lack of data on the value of large rivetted tension connections, particularly where a number of pieces are joined together as they will be in some of the very large tension members designed for the Quebec Bridge. A long series of tests for both tension and compression members of the Quebec Bridge have been ordered and it is now necessary to get these made outside of the country. I think these facts should be pointed out to the Government when asking for the establishment of a Testing Bureau.

Mr. John Kennedy

Supposing we had a thousand-ton testing machine, about what proportion would the strength of the member, which could be tested in that machine, bear to the strength of the members in large bridges?

Mr. Duggan

An ordinary column fails generally at between 25,000 to 35,000 lbs. per square inch, so that a thousand ton machine would enable us to test to destruction a piece of say 55 to 80 square inches in section.

Mr. Kennedy

That was not my meaning. In a test of a thousand tons, what proportion would that bear to the large members that are used in

really large bridges; or in other words, how far would it go toward giving information where information is most needed?

Mr. Duggan — Well, that would enable us to determine the chords of any railway bridge up to a hundred and fifty feet span. I might say that I had no more reason for saying a thousand tons than I had for saying twelve hundred or eight hundred, but I mean a testing machine of very large capacity.

Mr. Ogilvy.—As I understand it, the motion is to recommend the matter to Council. Surely our Council has means of getting at this matter in a definite form. We are getting beyond the motion, and I think there should be a vote on it.

Mr. Holgate — I would say that the more definite the recommendations are at the Annual Meeting, the better and more clearly the Council can deal with them. Mr. Duggan's amendment contains a more definite recommendation, and leaves it an open question with that object in view.

Mr. Jamieson — Is this meeting making recommendations to the Council, and is the Council to deal with this matter, or the Committee?

The President — Mr. Harkom made a motion and Mr. Duggan made an amendment. Mr. Duggan's amendment is as follows: "That the Committee be requested to represent to the Dominion Government the need of larger testing machines than now exist in Canada, and that they recommend the establishment of such a machine of not less than one thousand tons capacity. Further, that the Committee be authorized to co-operate with other bodies in bringing to the attention of the Government the desirability of establishing testing machines and other appliances by the Government."

What is your pleasure, gentlemen?

Mr. Harkom — I am quite prepared to accept that amendment, and to withdraw my motion. I certainly think there should be some provision made for full sized tests. In this country structures containing very large members will be built, and there should be some method of testing full sized members and knowing exactly what they will stand.

The President — You have heard the amendment proposed by Mr. Duggan. What is your pleasure?

Carried.

Mr. Keefer — Is the suggestion that it be limited to one thousand tons?

The President — Not necessarily. That is for the Committee to decide.

Dr. Galbraith — I beg to move that the President, in reading his address, vacate the chair, and that Mr. Mountain preside.

PRESIDENT'S ADDRESS.

In concluding my term of office I again wish to thank the members for the honour which they conferred upon me a year ago,

when they elected me President, and to express the great pleasure it affords me to congratulate the officers and members upon the continued growth and prosperity of the Society. The number of members of all classes, published in the Official List, in the autumn of 1887, immediately after the formation of the Society, was 365. The membership at the present time is 2,900.

The great advance in the prosperity of the country has resulted in an increased demand for engineers, which demand has necessarily been of financial benefit to the members of that profession.

The tremendous growth in the Dominion, more especially in the West, within the past few years, has rendered necessary the construction of two additional transcontinental railways; the increase in the production of wheat and other products in the Western Provinces has also resulted in a strong demand to the Government to increase the size of the Welland and St. Lawrence Canals. At the same time a large section of the country has so strongly impressed upon the Government the necessity of constructing the Georgian Bay Canal, that surveys, plans, and estimates of the cost of the work have been prepared.

It is to be hoped that the Government will also recognize the importance of making a thorough survey of the St. Lawrence route, with a view to an enlarged waterway.

In addition, the increased use of electricity, arising from the demand for cheap power, and the utilizing of the same by our municipalities, has necessarily involved the development of our great natural water resources, and this great development throughout the country has consequently increased the duties and responsibilities of our profession.

As my entire professional career has been devoted to municipal engineering, I propose to confine my remarks to this subject.

Municipal engineering is now recognized as a distinct branch of the profession, and includes a great variety of subjects, in which the engineer, embarking in this field, is supposed to be well versed. It is also necessary for him to possess considerable tact in dealing with the various members of his council, and with the public.

A municipal engineer, from the very nature of his duties, must be somewhat of a sanitarian. At present considerable attention is being paid to the health of the people, with the satisfactory result of a decreasing death rate. People moving into cities naturally ask, where do you dispose of your sewage, and from where do you obtain your water supply?

The old method of disposing of sewage by depositing it into the nearest stream, without any regard to the fate of the town situated lower down, is now very properly being discontinued. Plans for the purification of water supplies, and disposal of sewage are being considered, and plants constructed by a number of our muni-

cipalities. These plans for sewage disposal and water supply have now to be approved of by the boards of health of the different provinces. It is a regrettable fact that on very few of these boards of health is there any person qualified to advise upon engineering matters. In most of our provinces these boards are composed entirely of members of the medical profession, who have only a superficial knowledge of the engineering features of the plans submitted, and are consequently not competent properly to decide upon them.

There is now a bill before the Senate, which will be most drastic if it becomes law. The bill entirely prohibits the disposal of sewage into any body of fresh water. This will be a great hardship to many small municipalities who will be unable, for financial reasons, to put in a sewage disposal plant to comply with this act. From the wording of the bill it seems that they have entirely overlooked the fact that spring freshets yearly remove from the streets, roads, and farm yards large accumulations of filth, which eventually find their way into the rivers and lakes.

The question of the proper method of disposing of sewage is one of great difficulty, and no general scheme suitable to all towns can be approved. Each locality of necessity requires special study. Municipalities situated upon the Great Lakes may be allowed to discharge their sewage into the lake, after screening and sedimentation, provided the water supply is filtered and drawn from a point some distance from the sewage outfall. This method of disposal cannot, however, be permitted in the case of towns situated upon small streams, which are used for water supply. In such cases settling basins and filters will be required, and in the colder section of the country it will probably be found necessary to cover these filters.

The furnishing of an adequate and pure supply of potable water to the citizens should be the object of most careful study. Until recently it was not considered necessary to filter the water supplied to the majority of our Canadian municipalities. This problem is now, however, receiving general consideration. Toronto has just completed slow sand filters for the water supply, and is the first city situated on the Great Lakes to take this step.

Within the past few years the use of hypochlorite of lime for the purification of water has come prominently into use.

The obtaining and storage of a constant supply of water from the Great Lakes, through a long line of submerged pipe, is a problem of considerable difficulty. A brief account of the accident to the Toronto conduit may be of interest as showing the troubles and anxieties that befall the municipal engineer. To be suddenly called up in the night, and find that four hundred thousand people are in danger of a water famine, is only one of his many anxieties.

Toronto is supplied with water from Lake Ontario through a six foot rivetted steel pipe, made in lengths of between 150 feet and 160 feet, and bolted together with cast steel flanges.

Early in February a very severe storm from the east occurred, which filled the lake, as far as the eye could reach, with large quantities of floating ice, while ice banks thirty or forty feet high also formed along the shore.

On the 7th of the same month difficulty was experienced in obtaining a sufficient supply of water, and, on examination of the shore crib, a great many branches of trees and other debris were discovered. During the night all the pumps were closed down, and then started up, with the expectation that this would remove the obstruction. This method, however, proved unsuccessful. Divers were then sent down into the pipe where a log, twelve inches in diameter and twelve feet long, was found, as well as other small pieces of timber and a large accumulation of sand. Steps were immediately taken to have this sand removed by pumping, using a centrifugal pump. The supply of water to the city was entirely stopped and had to be obtained directly from the Toronto Bay.

Upon a further examination of the pipe it was found that about 600 ft. from the shore there was an opening of about four and a half inches in one of the joints, only ten bolts being left out of forty. Four other breaks were found in the pipe line, three pipes being entirely separated, all bolts removed and a great many of the rivets sheared off, making it necessary to have these pipes lifted and taken to the city for repairs. The four and a half inch opening, however, was repaired by putting in a tapered wooden gasket. Piles were then driven close together on each side of the pipe and the space filled in with concrete. The work of removing the sand from the pipe was one of considerable difficulty. We are now driving steel sheet piling on either side of the pipe for a distance of twelve hundred feet from the shore, leaving a space of about one foot between the pipe and the piling, and filling this space with concrete. The total cost of making these repairs will be nearly $100,000.

As a test of the efficiency of the hypochlorite of lime treatment for water purification, it may be pointed out that during the period of some weeks, when the city was using polluted water from the Toronto Bay, no considerable increase in typhoid occurred. Without this plant no doubt Toronto would have had a most appalling epidemic of typhoid.

The designing and construction of roadways is a branch of the municipal work that has not been so carefully considered as that of sewage and water supply. Macadam, especially in our large cities, is rapidly giving way to a more permanent and sanitary type of roadway. The ever increasing use of self-propelled vehicles demands

a roadway which is dustless and capable of resisting the wear and tear of motor cars travelling at a speed of from twenty to twenty-five miles an hour. At the present time roadway engineers are experimenting with various types of bituminous macadam surfaces to meet these conditions.

The alleviation of the dust nuisance in cities and towns, especially when the temperature is too low to permit of the use of water, should be more thoroughly studied. Medical men inform us that the clouds of dust which arise from the roads are germ-laden, and a source of danger to the health of the community. The use of vacuum-cleaners should be generally adopted as a more efficient method of cleaning the streets.

The transportation of people in large cities is a problem which has not yet been satisfactorily solved. Complaints are constantly being heard of the disgraceful congestion of the various street car services, particularly during the rush hours in the morning and evening. It is essential that traffic conditions in various streets, a subject that up to the present time has received very little consideration, should be carefully studied, in order to obtain a solution of the difficulty. There is also a growing tendency towards constructing, in the business centres, as far as possible, a noiseless pavement. The wooden block properly treated most nearly realises this ideal. For heavy traffic in the neighbourhood of docks, railway yards, etc., the granite block is the most satisfactory. For sidewalks, concrete has entirely taken the place of wood and makes an excellent walk at a reasonable cost. The only objection is that in winter, particularly upon slight grades, it is somewhat slippery.

A great deal of careful consideration will have to be given to the proper and most efficient method of collection and disposal of garbage, ashes, etc. Toronto has now this matter prominently before it, and has to decide whether a reduction plant, or the disposal of the refuse by incineration will be the most satisfactory.

The construction of street railway tracks in city streets is a work involving many difficulties. Experience in Toronto has shewn that T-rails, weighing from seventy to eighty pounds, and grooved girder rails, weighing from ninety to one hundred pounds, are the most satisfactory. T-rails are used on residential streets and in the out-skirts, but the heavy grooved girder type of rail is used upon streets subjected to heavy traffic. The rails are laid upon steel ties, six feet centres, with suspended joints. Under the whole of the track allowance pavement for about a width of 18 ft., a concrete foundation 12 inches in depth is used. This is increased to 18 inches at intersections. The City of Toronto has been experimenting this year with wooden ties, having two feet centres, to ascertain if the

vibration and noise caused by the use of the rigid type of construction necessarily involved by the steel ties could not be got rid of.

Following the almost universal practice in England, within the past two or three years, municipalities have evidenced a strong tendency towards operating public utilities, and, providing these services can be kept clear of politics, there is no reason why they should not be administered as economically and satisfactorily as by a private corporation, with the consequent result of decreased cost to the people.

The universal adoption of the telephone, and the great increase in the use of electricity, etc., has multiplied the number of unsightly poles and wires which now disfigure our streets. In European cities such poles and wires are very rarely seen, but up to the present time American municipalities have not taken very active steps towards disposing of these unsightly and dangerous nuisances. Montreal, I believe, has taken some steps towards the construction of lines of conduits for the use of the various companies. It is to be hoped that within the next two or three years other cities also will take this matter up.

The growth of the municipalities in the Dominion, as shown by the recent census, gives some indication of the large amount of money expended in constructing the facilities which are imperative in rapidly growing communities. With a view to presenting to the members an idea of the vast amount of money spent by the municipalities within the past ten years, I obtained, from twelve of the most important cities in Canada, a statement of the expenditure upon engineering matters only, amounting to the enormous sum of approximately one hundred million dollars. This does not include money expended upon the construction of street railway lines, and in some cases does not cover the amount spent in cleaning streets, and disposing of garbage, nor upon public buildings.

I also endeavoured to obtain a record of the number of miles of roadways, sidewalks, sewers and water mains constructed during this period, but, unfortunately, some of the cities have no records extending back so far. I am, however, able to give you these statistics from Winnipeg, Montreal and Toronto.

CITY.	Miles of Pavements.	Miles of Sidewalks.	Miles of Sewers.	Miles of Water Mains.
Winnipeg	85	266	135	144
Montreal	37	120	114	40
Toronto	251	410	70	114

In addition to the construction of these various improvements there have been other and more important works carried out, such

as the building of electric plants, street railway lines, subways, bridges, abolition of grade crossings (part of the cost of which is generally borne by the municipalities), the construction of sewerage works, filtration plants, etc.

The spending of this stupendous sum of money distributed over such a large number of contracts should give the public some idea of the immensity of detail required in designing and carrying out the various works. Unfortunately, the average citizen does not seem to appreciate the length of time and the attention required to successfully carry out so vast an amount of work, and the municipal councils frequently insist upon having estimates and plans prepared in such a limited time that it is almost impossible to avoid mistakes, resulting in extra charges, etc.

It is to be regretted that in many of the municipalities the members of the council are not cognizant of, or do not sufficiently realize the importance of the work undertaken by their engineer. This, I think, is one of the reasons for the unfortunate criticism, fault-finding, etc., which so frequently occurs. The engineer, as an adviser of the Council, should receive more assistance than the head of any other department, because his department is the one which involves the greatest expenditure in the city service, and the one which naturally the citizens are apt to consider critically. During the past year I have heard of two or three cases in which the engineer considers he has been treated most unfairly by the municipality, and this tendency to censure unjustly an engineering officer seems to be increasing. This is a very difficult matter to deal with, but could perhaps be alleviated if the members of our profession asserted themselves more emphatically, and could induce the press to realize the difficulties that beset the engineer in carrying out the various works. Unfortunately it seems to have become the habit of some members of the press to make assertions derogatory to the engineers without first ascertaining whether they are based upon fact or otherwise.

A very large number of the members of the Society are brought into daily contact with laborers. This is especially the case on railway construction and other works remote from civilization, and, whilst it is not an engineering question, it has occurred to me that by some effort on the part of engineers the conditions of the men engaged upon these works could be materially improved. We all realize that the more perfect the sanitary conditions of these camps, the better the food, etc., the better is the quality and quantity of the work performed. The consideration of the labor problem should receive more attention than is usually accorded it.

The question of deciding upon the proper examination for admission to the Society of applicants who are not graduates of any

recognized engineering school, is one which will have to be carefully considered by the incoming Council.

In concluding this address, I regret that, owing to my residence away from head-quarters, I have not been able to give the attention to the affairs of the Society which I have wished, but through the untiring efforts of the Members of the Council, and of our Secretary, the interests of the Society have been well looked after, and, upon retiring from the office of President, I wish to thank those gentlemen for the able manner in which they have assisted me during the year.

FRIDAY MORNING'S SESSION, JANUARY 26TH, 1912, 10 A.M.

Gentlemen, we will proceed with the business. The examiners of student papers have recommended the awarding of the prize in the General Section to Mr. Percy E. McDonald, for his paper on "A General Description of the Structural Detail of Buildings." We will now proceed with the discussion on the reports of Committees. The President

The Secretary called attention to the excursion provided for the afternoon, stating that Mr. R. J. Levy, the manager of the Oxygen plant, had kindly undertaken to conduct the party to Maisonneuve.

Is there any gentleman present representing the Committee for Roadbed and Ballasting? The President

MR. MACKENZIE.—Mr. President, may I ask what you propose to do regarding this report?

We wish the report to be received, and we will be glad to have any discussion on it. The President

I am a member of the Committee and am not authorized to present the report, but I have something to say regarding it, if it is in order. Mr. Mackenzie

It is now open for discussion. The President

I think that this report is one of the most important that we have. I came here purposely to take part in the discussion of it, and am very much disappointed to find that the Chairman is not present. I do not know whether there is any communication from him. Mr. Mackenzie

This matter came up the other day, and we postponed it until to-day. We have had no communication from the Chairman of that Committee. The President

The practice has been to have any member of the Committee who is present represent the Committee. The Secretary

Since that is the case, is it in order that I should make a few remarks on this report before it is received? Mr. Mackenzie

Certainly. The President

I may say, Mr. President, that I heard nothing of this proposed specification until about a month before this meeting. I spent a Mr. Mackenzie

couple of days going through it, and jotting down my views regarding certain points which are contained in it, which I sent to the Chairman. The report, however, has been printed as it originally appeared without any change whatever. There is a great deal of railroad building in Canada at the present time, and I think it would be of very great benefit and convenience to all engineers engaged in railroad work that a standard specification should be adopted by this association. There are a great many different specifications in use at the present time on roadways, and this draft presented by the Committee has been largely modelled on the standard accepted by the American Engineering Association, with improvements, or supposed improvements, sandwiched in here and there.

Now, in comparing it with the standards as found in the 1911 Manual of the American Engineering Association, the first difference we find is in the marginal references, which are very convenient in actual work, particularly if there is an index at the beginning. Here we have no marginal references at all.

In paragraph 8 it is stated:—

"Stumps shall be cut off even with the ground, where clearing "is to be done, except between the slope stakes of embankments, "where they may be cut so that the depth of filling over them will "not be less than 2½ feet."

If the wording of the specification is carried out literally, you might have stumps there 17½ feet high. It seems to me that this part requires revision.

Paragraph 11 says: "All trees that may be reserved shall be "stripped of their tops and branches, made into ties, or cut to such "lengths as may be directed and neatly piled up at such places "on the right of way as may be designated, for which service pay- "ment may be made by the tie or by the cord of 128 cu. ft."

I think, Mr. President, with reference to that particular paragraph that we should make it quite clear that the wood cut on the right of way belongs to the Railroad Company and not to the Contractor. These are small details, but they always come up in carrying out the work. If we are to make a specification as a standard, let us make it so clear that there will be no differences of opinion with the contractor when the work is being carried out.

In paragraph 12 it mentions that close cutting is to be included in the price paid for clearing. It seems to me that is not right. Close cutting should be paid for separately.

Paragraph 16 says: "Grubbing shall also be required between slope stakes of all embankments of less than 2½ feet in height."

In this paragraph the 2½ feet mentioned conflicts with the 4 feet mentioned in paragraph 18. That requires revision.

Paragraph 18 says that the grubbing shall be paid for separately.

It seems to me it should be measured in acres. The contractors understand acres better than any other measure for that kind of work.

The grubbing should be paid for whether over excavation or elsewhere. It is sometimes said that if a contractor takes out stumps with a steam shovel he has no right to be paid for grubbing. That is not correct. It costs the contractors just as much to handle stumps with a steam shovel as it does to remove them in any other way, because they have to be handled two or three times.

Am I going into too much detail, Mr. President?

The President. We have a great deal of business to go through this morning, and I was about to suggest that if the report is not satisfactory to you, Mr. Mackenzie, it should be referred back to the Committee, which is supposed to have agreed before it was presented.

Mr. Mackenzie. It has not been agreed upon by the entire Committee.

The President. Will you move that it be referred back to the Committee?

Mr. Mackenzie. That would result in putting it back a year.

The President. As you are the only member of that Committee present, if we were to discuss it in detail, I do not know that we could do very much, because the other members of the Committee may not agree with you.

Mr. Mackenzie. The notes that I have read were sent to the Chairman of the Committee about three weeks before the meeting.

The Secretary. Perhaps Mr. Mackenzie would give a general criticism, with a motion that the report be referred back to the Committee.

The President. Would it be satisfactory for you to make your suggestions in writing, which, of course, would make it necessary to have the report referred back for another year?

Mr. Mackenzie. I see no other course. The report will have to be postponed for another year.

Mr. Mountain. I sympathize with Mr. Mackenzie. I think we should have some finality in these matters. We all know that these reports are particularly useful to railway engineers, and we are now using the American Railway Engineering Association standards. We prefer to use our own. This Society has made standards and they are approved.

The question of bridge specifications will come up shortly. That Committee was formed, I think, two years ago, and I understand to-day that it is to be brought up and carried over. Now, we are dealing to-day with half a dozen different specifications, and I, for one, would particularly like to see the matter closed up and some finality reached about these specifications.

The President. Would it be satisfactory, Mr. Mackenzie, to authorize this meeting to have these specifications adopted when they are revised, but not wait for another year?

Mr. Clement

The adoption of a standard specification by this Society may debar certain members who are working under specifications of their own. I do not think the Society should adopt the standard until all the members have had a chance to be present and disucss it. We have had brought before us a specification, and the only member of the Committee present states that he took no part in forming that specification, and did not know it was being adopted by the Committee. I would move, sir, that this report be referred back to the Committee, and that it be brought before the meetings of the sections and various branches for discussion, and that the result of these discussions be sent in in the form of suggestions to the Committee for their consideration.

Mr. Duggan

I entirely agree with Mr. Clement's remarks. I think we ought to go further and revise our whole method of dealing with these reports. The matter was brought up in Winnipeg last winter and it was then agreed that the reports should be issued one month before the Annual Meeting, so that they might be discussed. As a matter of fact, we have at the Annual Meeting perhaps not over five per cent. of the whole membership of the Society, and there is a great deal of other business to be attended to. The reports are often too long to be read over clause by clause, as in the other Associations, and they are adopted or rejected or sent back to the Committee for continuance. I agree with Mr. Clement's excellent suggestion that the report should be read by the various sections and discussed by them. We should go even further, and when a Committee considers that a report has been discussed as far as possible, both before the various branches and by written communications, they should issue a final report for letter ballot by the Society. This Society, extended as it is all over the country, can hardly deal with important matters in any other way than by letter ballot. I think a resolution should be passed to that effect. and I have much pleasure in seconding Mr. Clement's motion.

The Secretary

Might I say for the information of those present that as far as possible the resolution of the Annual Meeting at Winnipeg was carried out? The only reports which are presented here are those which were turned in a month before this meeting, and they were in the hands of the members about three weeks before the meeting. There are other Committees which have not reported at all.

Mr. Mackenzie

I wish to make two suggestions before the discussion ends, with regard to the standard specifications. When this special specification is completed by the Committee and before final adoption by the Society as a standard, a copy should be sent to every member of the Canadian Society of Civil Engineers, giving him a month to reply, and to send in any suggestions or criticisms which he may wish to make by letter, to the Secretary of the Society. No one can then complain that he did not have a chance to say what he

wanted about any standard specification. Furthermore, I think it would be helpful if a copy were sent to every one of our principal railway contractors in Canada, as some contractors have decided views with regard to these specifications. I do not think it fair that the man who does the greater part of the work should have no say whatever in the specifications under which he is working. Some contractors are also engineers, and most of them are very intelligent men and can give engineers pointers regarding the specifications, as well as the actual carrying out of the work. In my opinion we should request the Secretary to ask the assistance of some of those contractors in preparing a standard specification.

Would it not be well for the members of the Committee to send the information out to the contractors, and get their ideas before submitting a report? The President

I think the Society as a whole should perhaps request the Committee to do that. It would carry more weight, and they might have very different opinions about the advisability of doing it. Mr. Mackenzie

The members of the Committee probably would know who the contractors are better than the Society at large. The President

If the suggestion were made to the contractors, I think it would be a great help to suggest that the Committee do it. Mr. Mackenzie

It seems to me, Mr. President, that the Canadian Society of Civil Engineers should not overlook the remarks of the Chief Engineer of the Intercolonial Railway, who says to us very frankly that he has not been consulted, and that the Committee of which he is a member did not write to him stating what report they were going to propose for adoption. I believe under the circumstances we ought not to adopt this report. Mr. Lesslie

Well, gentlemen, is it your pleasure that we dispose of this matter, or leave it over for another year, by referring it back to the Committee? The President

It is too important to be left over. Mr. Duggan

The question of Committees and the question of dealing with specifications require a great deal of consideration. If the Society is going to issue specifications, they should certainly be most carefully prepared and every point corrected before they are adopted. That involves a very large amount of work, and Committees should have every consideration from the Society, and should not be subjected to undue criticism because there are many points that cannot be dealt with to the satisfaction of all. The Committee should consider every clause carefully, getting the advice of others wherever necessary, after which the report should be brought before the Society and the recommendations made. Then the Annual Meeting may be able to deal with it to better advantage. Mr. Jamieson

It is quite impossible to discuss these reports, clause by clause, during our Annual Meeting, unless we devote the whole of the time to a discussion of the business affairs of the Society, and eliminate the trips around the city. If any report is not in condition as to be above fair criticism, I think it might be well for it to be referred back to the Committee for another year, with a view to improving upon it, and making final recommendations.

Mr. Monsarrat

MR. MONSARRAT.—Mr. President, in regard to the bridge specification, it has been very difficult to get a discussion of the various clauses contained in it, on account of the Committee being so widely separated all over the country. As Mr. Jamieson has said, there is a great field to be discussed and it takes a great deal of time. I think, therefore, it would be a great advantage if a Secretary were appointed for the Committee who could look after the correspondence and the collating of information, while the resident members of the Committee could discuss the matter and make suggestions. The Secretary could see that these suggestions were forwarded to the outside members of the Committee and get their written suggestions, and after they had come to an agreement in the matter, these reports could be submitted to the Society as a whole, and written discussions on them sent in, or opportunity given to discuss them or bring up any point for the Committee to discuss. The reports could then be put in proper shape and submitted to the Society at the Annual Meeting, thus eliminating a great deal of discussion.

Mr. Jamieson

I agree with Mr. Monsarrat that, when there are a great number of Committees, dealing with these reports, there should be a secretary, who would act for all the Committees. A great deal of research is involved in connection with matters of specification, which could be done by the secretary, as it is very difficult for the general members of the Committees to do so. After the preparation of a specification, which is essentially a one-man job along with a secretary, it could then be sent out to the other members of the Committee for their revision or suggestions and concurrence. After that final revision it could be referred to the Annual Meeting.

The President

At our Annual Meeting in Winnipeg provision was made and authority was given to spend money for that purpose.

Mr. Harkom

Instead of dealing with this special report, the discussion is taking a general form. As has been said before, I think it will be desirable to send out and get the expression of all the members beforehand.

The act of putting out a specification by the Society, for which the Society is responsible, should be very carefully considered. There is also the question as to whether the meeting, such as this Annual Meeting, is really properly qualified to dispose of such a subject. Would it not be better, Mr. President, that all Committee

reports when they come in should be dealt with by the Executive Council and that they should not be issued as authoritative, but as recommended practice. It might then be possible, if provision is made in that way, for a Committee's report to be issued between Annual Meetings, and, if a secretary were appointed for that purpose, it could be sent out to all the members of the Society who are interested and qualified to speak on the subject, after which the Council might deal with it in a far more satisfactory manner than at a meeting like this.

Mr. Harkom has raised a new and very important point, viz., the question of sending in the report or specification for revision by the Council. When we appoint Committees at our Annual Meeting we are supposed to select for members of that Committee members of our Society best qualified to deal with the subject under discussion. If that is so, then that Committee should be better prepared to draw up a full report or specifications than the Council is; furthermore, they are appointed for that special purpose, while the Council has many other duties to perform: I think, therefore, it is essentially the work of the Committee and not the work of the Council. It also raises the question as to whether the Committees appointed at the Annual Meeting are Committees of the whole Society, or of the Annual Meeting, whether they are subservient to the Council of the Society or whether they report directly to the Annual Meeting. All Committees necessarily must work in concurrence with the Council, because the Council is the governing Board of the Society, but they should not be subservient to the Council, nor have to depend on sending in their report for revision to that body. Otherwise it would take away all sense of responsibility and pride that the members of the Committee may have. We ought to know exactly what is the standing of our Committees. Mr. Jamieson

Mr. President, in answer to Mr. Jamieson's question, the procedure in regard to Committees is quite definite, whether it is a proper one or not. It is as follows: The Committees draw up their reports, and, when, in the opinion of the Committees, the reports are ready, they are sent in to the Council. The Council is instructed by the Annual Meeting to send these reports out to the members for their information, and for any discussion they may wish to make. The reports are then supposed to be ready for consideration by the Annual Meeting. The Secretary

Yes, but that does not involve the revision of any report by the Council. Mr. Jamieson

No, certainly not. The Secretary

I have raised this question because there are certain cases in which the Council has, I think, interefered with the personnel of these Committees, which is not within its rights. Mr. Jamieson

Mr. Harkom — It is not my intention to suggest that the Council be authorized in any way to deal with the reports of Committees.

The President — We are now discussing the report on Roadbeds and Ballasting and nothing else, and I would like someone to make a motion in regard to it.

Mr. Jamieson — I move that the report of the Roadbed and Ballasting Committee be referred back to the Committee for the incoming year.

Mr. Schneider — MR. SCHNEIDER.—I would move an amendment to the motion, that the reports of Committees or every report should be submitted to one special meeting of the Society for discussion. It is utterly impossible to discuss so many reports at one meeting, and if the reports on Bridge Specification and nothing else were submitted at one meeting, we would have an interesting paper. It has been stated here that there are no interesting papers for discussion brought up in the Society. These reports of Committees are practically papers which could be submitted to the Society and receive proper discussion, which, I consider, is utterly impossible at the Annual Meeting. I therefore move that the report of the Committee be submitted to the Society and be discussed at any meeting, but not at the Annual Meeting.

Mr. Duggan — I understand, Mr. President, that you are dealing simply wtih this report of the Committee on Roadbed and Ballasting.

Mr. Mackenzie — At the request of a member, I add to my motion that it be referred back, and in the meantime copies be sent out as early as possible to all members for suggestions, and that it be printed after final revision.

Mr. Jamieson — What I have asked Mr. Jamieson to include in his motion is that when the Committee's report is made as good as they think they can make it, a copy be forwarded to each member of the Society and to prominent contractors, requesting that suggestions and criticisms be sent in within four weeks.

Mr. St. George — Why not specialize the men to whom you would send it? For instance, a bridge report should be sent to bridge builders, and thus time would be saved.

Mr. Mackenzie — I mean to contractors in that particular line of work

Mr. Holgate — Is it not included in the printed reports of Committees?

Mr. Jamieson — Well, that is the meaning of the motion that I wish to propose. I will write it out if necessary.

Mr. MacGowan — MR. MACGOWAN.—I wish to second the motion.

Mr. Duggan — I beg to move an amendment to the motion adopting Mr. Clement's proposal, namely, that this report be referred to the various Branches, and that they be asked to discuss it, and report their discussion to the Committee. Also that every member should be asked by letter to send in his opinion or suggestions before the 1st of March, let us say, and that the Committee should then deal

with the suggestions and issue the report for letter ballot to the Society.

If the matter is to represent practically a standard specification, it surely is a matter of sufficient importance that a number of men who are at a distance be given an opportunity to discuss it. The question will then be dealt with within the next two months in the same way as would be necessary if it were referred back to the Committee to be dealt with at the next Annual Meeting.

I second the amendment. Mr. Clement

There is very little difference between the amendment and the original motion. Mr. Jamieson

I have a communication from Mr. Muckleston, of Calgary, who sends in a discussion on the report of the Committee on Roadbed and Ballasting. The Secretary

Had not that better be referred to the Committee? Is that your pleasure? The President

Carried.

While the amendment is being prepared, there was a motion brought up the day before yesterday by Mr. Stead, which was duly seconded, but the meeting took no notice whatever of it. I wish to bring that motion to the attention of the meeting now, and I would therefore move that in future the Council form a reception committee to receive the outside members and introduce them to the local members of the Society at every Annual Meeting. Mr. Skaife

I understood that Mr. Stead withdrew his motion at that time, and I stated that we would bring it up to-day as new business. The President

May I say just a word about these reports while the amendment is being prepared? I think it would be well if the Specifications were to include only those points upon which the engineers are well agreed, and that the specification to be considered as standard should be accompanied by remarks giving recommended practice for meeting special conditions. In many instances departures from standard practice are necessary in order to meet special conditions, and remarks applicable to such conditions are very valuable. Mr. John Kennedy

I have in mind a specification of the American Society of Civil Engineers, and another of our own, which are badly involved. The specifications proper and the remarks as to variations in recommended practice, including the recommendations of the American Association for Testing Material are given, and while much valuable information is thus given, it is utterly impossible to adopt the specification as it stands; that is, one cannot refer to it, stating that the work and materials are to be according to the specification of the Canadian Society of Civil Engineers, because it will not work as a specification. Now if the specification proper were to include only such points as are standard and agreed upon as suited

to all ordinary purposes, and be accompanied by an appendix containing remarks upon recommended practice applicable to special conditions, it would make the specification more valuable and more workable.

Mr. Duggan — Mr. President, my amendment is as follows: That a notice be sent out requesting each of the Branches to discuss this report and report the discussion to the Secretary not later than the first of March. Also that those who cannot attend the meeting be requested to send in written discussion before the first of March, and that the Committee be requested to take such discussion into consideration and send out the report again for adoption by letter ballot not later than the first of June, such ballot to be returned not later than the first of July.

Mr. Shearwood.—Mr. Duggan's amendment seems to be in the right direction, but I think one important point is to get a discussion of the suggestions.

Mr. Tye — The suggestion that these specifications and reports be discussed separately at a meeting is a valuable one. I think that personal discussion often brings out even better points than written discussion, and if Mr. Duggan's suggestion could be carried out and then referred to one of our ordinary meetings called for that purpose, it would be then discussed just as an ordinary paper would be.

Mr. Mackenzie — I see that the amendment has ignored the suggestion that prominent contractors in the same line of work should be given an opportunity to make suggestions or criticisms. If it is the intention of the meeting that it should be so included, I have nothing further to add. Otherwise I think it should be included in the amendment.

Mr. Duggan — I did not intend to ignore that excellent suggestion by any means. I should think the Committee in dealing with the specifications would be only too glad to get ideas from contractors, and I would therefore amend my amendment that notice be sent out to members of the Society as well as to the prominent contractors. It is difficult to include it in the motion.

The President — The resolution and the amendment are practically the same with the exception of the word "contractor".

Mr. Tye — I wish to put my suggestion in the form of an amendment to the amendment, or perhaps Mr. Duggan, who seems to favour it, might include it in his amendment and not necessitate a further amendment being made.

Mr. Jamieson — Is it not in order for the Society to call a meeting and have it discussed?

The President — When?

Mr. Jamieson — Immediately, or at any time.

The President — Yes, I think so.

I mean without a motion to that effect. Mr. Jamieson

While the amendment is being prepared with the further suggestions that have been added, there is a resolution that has been moved by Mr. Skaife to that effect that hereafter at all annual meetings of this Society a reception committee be named by the Executive Council to see that the outside members meet the local members. This is moved by Mr. Skaife and seconded by Mr. Harkom. What is your pleasure, gentlemen? The President

Carried.

My amendment will now read as follows: That notice be sent out requesting each Branch to discuss this report and report the discussion to the Secretary not later than the first of March. Also that those who cannot attend the meeting be requested to send in a written discussion before the first of March. That the Committee be requested to take such discussion into consideration and ask for a letter ballot on a final draft of the report, not later than the first of June, such ballot to be returned not later than the first of July. Mr. Duggan

You have heard Mr. Duggan's amendment which has been seconded by Mr. Clement. What is your pleasure? The President

Does this amendment refer to all reports, or to this special report? Mr. John Kennedy

To all specifications. The President

Carried.

It is understood that the Council will issue all specifications when amended to the membership for vote by letter ballot. Mr. Duggan

I think that all members here present should have an opportunity of discussing this now. Mr. MacGowan

I have declared the amendment carried. The President

The report of the Annual Meeting asks for discussion of all reports, and it seems now that all this discussion is to be eliminated. We, who have come here from a distance, do not get an opportunity to discuss them. Mr. MacGowan

I might say that I had no intention of eliminating discussion in making my amendment. Mr. Duggan

There is another important matter for discussion, viz.: the proposal to sell our property. I will ask the Secretary to read the communication that he has with regard to this project. The President

The Secretary read the following extract from the minutes of meeting of the Council of Canadian Society of Civil Engineers, held 13th January, 1912:—

"The Committee having in charge the proposed sale of the Society's building, No. 413 Dorchester Street West, reported that subject to the approval of the Council and of the general meeting they

had arranged for a sale of the said property for the sum of $60,000 payable as follows:—

1. $10,000 at once, to be forfeited as liquidated damages if the balance of the cash instalment of $40,000 be not paid within two weeks from delivery to the purchaser, Mr. W. E. Bolton, of copies of resolutions of Council and of a general meeting authorizing the sale.

2. $30,000 on execution of the deed within two weeks as aforesaid.

3. $10,000 at the end of twelve months from the date of the deed of sale.

4. $10,000 at the end of twenty-four months from the date of the deed of sale.

The said two instalments of $10,000 to bear interest at the rate of six per centum per annum payable semi-annually, and to be secured by first hypothec on the property sold. The deed of sale to contain the clauses usual in a deed of loan to secure payment of the said balance, and the terms and conditions to be to the reasonable satisfaction of the Company's solicitor."

It was resolved unanimously that the Committee's report be accepted, and that the President and Secretary of the Society, or such other officers as may be hereafter appointed for the purpose by the Council be authorized to complete the sale and to execute the deed in the Company's name, the whole on condition that the sale and this resolution be approved by a resolution of the Society at its Annual Meeting.

On motion by W. F. Tye, seconded by E. Marceau, it was resolved that the action of the Council be approved, and that the Council be authorized to carry out the sale on the terms of the resolution: all other terms and conditions to be such as the Council or the officers selected by it may approve.

Mr. Skaife — I would like to ask in this connection if there is a real estate broker's commission of two and a half per cent to come out of the amount mentioned, or do we deal directly with the purchaser?

The President — We do not pay any commission.

Mr. Ogilvy — As a matter of information, Mr. President, will you state at what value this property stands on the books of the Society at the present time?

The Secretary — A little less than $16,000.

Mr. Keefer — When do we require to vacate the premises?

The Secretary — The property is turned over on the 1st of May, but we may remain as tenants for some time thereafter.

Mr. Keefer — Has the Committee any other site in view that we can obtain?

The President — Yes, we have two or three sites in view.

Have you figured out how much it comes to by the square foot? Mr. Keefer

About $22. The Secretary

Is there interest to be paid on the other two instalments of ten thousand dollars? Mr. St. George

Yes, at six per cent.

Mr. Murdoch.—Will it cost more or less than $60,000 to get the new premises?

We should take this occasion to get a better site and house than we have now. This is getting a little small for us, and I think we could very well afford to take the $60,000 and put $20,000 or $30,000 more to it, and secure a good building. Mr. Tye

What is your pleasure, gentlemen? Shall we approve of this sale? The President

Carried unanimously.

I would like to move in connection with this matter of securing new premises that a Building Committee be named by the Society for looking after the erection or procuring of a site. I think the Council of the Society has enough to do without looking after that matter exclusively, and I would like to name on that committee Mr. St. George, whose services in connection with securing this site and building were most valuable. Mr. Skaife

No, leave it to the Council. Mr. St. George

I think that had better be left to Council. The President

It seems to me the Council should be authorized by this meeting, if it is necessary, to purchase another property without coming back to the Society for authorization. I therefore move that the Council be authorized by this meeting, if it is necessary, to purchase another property without coming back to the Society for authorization, and that the Council be given power to spend the necessary money to erect a suitable building, say not to exceed $100,000. Mr. St. George

I wish to second the motion. Mr. Skaife

What is your pleasure, gentlemen, in connection with this motion? The President

Carried unanimously amidst applause.

With all due deference to the mover and seconder of this motion, it seems to me you are passing a serious matter, very casually. I repeat this statement as a non-resident of Montreal. We outsiders, who are not represented here should have something to say as to whether $100,000 should be spent on a building in Montreal. Prof. Haultain

The matter is not open for further discussion. The next order of business is the report on Railway Ties. The President

Why not apply to this report the same procedure as that applied to the last, in which case we would not require any discussion here at all? Mr. Tye

The President — What is your pleasure, gentlemen?

Carried.

Mr. Mountain — What about the bridge report?

Voices — The same thing.

The President — Is it your pleasure that Mr. Duggan's amendment apply to all reports of the different Committees?

Mr. Duggan — I must say that I made my amendment simply to deal with the Report that was then before the meeting. I think it is a great mistake that when men have come a long distance to discuss these matters they should not have an opportunity to do so. If we have other business of importance to get through, let us dispose of it, after which we can go on and discuss the reports as long as we have time to do so, that is to say, let us resolve ourselves into a Committee of the whole Society to discuss these reports. I do not think they should be disposed of in any such off-hand manner as is now suggested.

Mr. Jamieson — I agree with Mr. Duggan, that if the Society is going to issue specifications, there is scarcely any more important business that we have to deal with in order that they should be put out in proper shape, otherwise we should not put them out at all.

Mr. Tye — Will not this method of dealing with them reach that result? We have only about an hour more to discuss these matters and we cannot go through all the reports in that time. If they are to be discussed at the Annual Meeting, our only course is to do the same as the Maintenance of Way Association does in Chicago. If they are going to be taken up at the Annual Meeting, there is nothing else to do but to eliminate all our visiting. If we are to have these strictly business meetings, we will have to discuss the reports and nothing else, and give one-half the day to general business only. However, it seems to me, this other method of procedure of having discussion on the reports by the different Branches and finally sending out a letter ballot is a very good one, in view of the fact that we like these excursions to the different places of interest in the city.

The President — If we get through our business in time we can have some discussion on these reports. What is your pleasure regarding the motion?

Carried.

The President — We have the report of the Scrutineers and the Nominating Committee and several other matters now before the meeting.

Mr. Chipman — What is the first on the programme?

The President — We have now disposed of all the reports, Roadbed and Ballasting, Railroad Ties, Good Roads, Sewage Disposal, etc.

Mr. Chipman — I was not aware that the sewage report had been disposed of.

It was not quite settled, but I understand all these reports are to be sent back to the Committee. The President

Until next year? Mr. Chipman

No, certainly not. The President

There is one question in connection with the sewage disposal matter that I would like to bring before the attention of the meeting. The Senate of Canada has before it a bill dealing with sewage disposal—a rather important one, which will come before the House shortly. The point is whether this Society should take cognizance of the Bill, either through the Council, through a committee, or in any other way. If our opinion is of any use at all, now is the time to voice it. I confess to being somewhat puzzled as to just how we should proceed. There is some danger of a law being passed which will be unworkably severe. Mr. John Kennedy

What are we going to do with the Good Roads report? That is a very important one. Mr. Mackenzie

In referring these reports back to the Branches and the membership generally, we are giving everybody an opportunity to discuss them. The point is that we cannot discuss them here to-day. Mr. Tye

Mr. Marceau.—I quite agree with Mr. Tye that these reports should be referred to the different Branches for discussion and suggestions.

I did not hear Mr. Duggan's amendment very clearly. How is the vote on these reports to be decided? Dr. Galbraith

The action we have taken as regards these reports is a very good one in every respect. But what shall we do regarding the Sewage Disposal Bill now before the Senate? It would seem desirable that it should be held over, because it is understood to be not altogether in line with what I fancy the majority of engineers think practicable. Can our Council take any hand in the matter and ask that it should be held over? I am sorry I have not a definite proposal to make, but the case is rather a serious one and something ought to be done. Mr. John Kennedy

I quite agree with you, Mr. Kennedy, that the method involved is a very drastic one, but some engineers, I believe, are rather in favour of it. I appeared personally before the Senate some two years ago, at its request, and gave my opinion in connection with the matter. I also called the attention of the City of Toronto Council to what was proposed, but that body has not taken any action. The public generally, I believe, approves of Senator Belcourt's act. The Society should, in my opinion, pass a resolution suggesting that the proposed legislation be postponed until an opportunity has been afforded of taking it up with the Committee. Mr. Chipman has been interested in this question and I would like to hear his views on it. The President

Mr. Chipman — I have read with great interest the report of the Committee as published. I regret to say, however, that there are some inaccuracies in it which should not have gone to the public. For instance, it is stated that typhoid fever was caused by the floods in the streams. Now, all who have lived in the country referred to know that typhoid fever is epidemic in many towns far distant from the streams, and in the towns cited the typhoid epidemic was in sections of the city that were not served with the water supplied from the river which is supposed to carry the infection.

With respect to the pollution of Lake Ontario there are contradictory statements, one being that Lake Ontario water is the purest on the face of the earth, and another to the effect that it is badly polluted. I do not think a report like that does any credit to the Society. While it is true that the City of Guelph was in trouble respecting its sewage disposal, the facts were not all stated. The works were improperly conducted, as all municipal works are likely to be at times, through mistaken motives of economy, but the cause of the nuisance was not due to the sewage disposal plant. These works are quite up to date at the present time, and enlargements to them have been made.

I think we should receive the report, but not adopt it, as the Chairman of the Committee is not here. Mr. Kennedy and myself are the only members of the Committee present. I also think we should be permitted to report again next year.

The President — If this meeting should take any action in regard to Senator Belcourt's bill it should be promptly done. The bill prohibits the discharge of sewage of all kinds into any body of fresh water.

Mr. Chipman — We are all studying these problems, and I do not think anything would be gained by taking any action in the matter at the present time.

Mr. Tye — It would, I think, be desirable to appoint a Committee to deal with the subject, and if it is necessary, the Committee should appear before the Senate and assist it in its legislation. The Senate would, in my opinion, be glad to have the services of a Committee from this Society. This Committee should be composed of men like Mr. Chipman, who are authorities on the subject. It is a part of our duty to guide legislation on such an important subject. Our Committee composed of the proper men would certainly know more about such a matter than the members of the Senate, and I beg to move that a Committee be appointed to consist of Mr. Chipman, Mr. Kennedy and Mr. Lea, to deal with this subject before the Senate, and that their expenses be paid by the Society.

Mr. St. George — This bill has been before the Senate for so many years that it would scarcely seem desirable to hamper the proposed legislation at this late date. The Committee might, however, advise the Senate especially with reference to giving certain municipalities the necessary guidance.

You must not forget that the Provincial Governments are also looking into these problems and are proposing legislation regarding them. The very best medical authorities in the country have been engaged by both the Provincial and Dominion Governments to study the question, and I think we would not be quite in our proper place in going before the Senate at this moment. I do not see what civil engineers would have to gain by adopting such legislation as would prevent cities and towns from making an outlet for their sewage systems into any river. There is still a great deal of controversy on the subject. Mr. Leefred

I have great pleasure in seconding Mr. Tye's motion. I feel confident that the Society can leave it in the hands of the men named. Mr. St. George

I think, Mr. President, that it is a very excellent suggestion to have an advisory committee, and that this Society should show its willingness to co-operate with the Government and assist it to prevent the pollution of our rivers and streams, because, of course, that is a very serious and important matter. Mr. Keefer

You have heard the resolution. What is your pleasure, gentlemen? The President

It seems to me the Committee is rather small. Mr. John Kennedy

I would suggest that Mr. Tye be added to that Committee. The President

I wish to put myself right before the Society. I do not wish it to be understood that I am not in sympathy with Senator Belcourt's bill, but merely that I did not think we should pass any resolution advocating the passing of that bill at the present time. I believe we should give every assistance in our power, and no body of men should be better qualified or in a better position to assist the Government, than we are. Mr. Chipman

I did not mean by my resolution that we should appoint this Committee and bind its hands. It should be left free to do what it thinks best under the circumstances. Mr. Tye

Is it your pleasure that this motion should carry? The President

Carried.

There is a letter here from Mr. Jardine Forrester. The President

The letter was read by the Secretary as follows:—

"Considering the fact that there is a very great diversity of opinion among engineers as to the lasting properties of cast iron and steel, more particularly as applied to water mains, would it not be advisable for the Canadian Society of Civil Engineers to appoint a Committee to consider the matter, obtain all data, and report? Such action on the part of the Society would, I feel certain, be much appreciated by engineers who are called upon, in their capacity as advisers to municipalities, to recommend the adoption of either one or the other. There is, of course, no question as to the cost of steel mains being very much lower, both as

regards first cost of the material, transporting, and laying and jointing, as also much less liability to fracture, but the matter of the lasting properties is a very undecided and indeterminate one. Cast iron has, of course, been in use for a very large number of years, and the results have been such as to show that there is no danger to the reputation of any engineer in recommending same. Such, however, does not apply to steel mains, and therefore engineers are very loth to recommend them, even though the saving may be very considerable. I am well aware that large quantities of steel pipes are being laid in Canada, the United States, Australia and South Africa, but this is in comparatively recent years, and sufficient time has not elapsed since the laying of the first of these to fully determine their lasting properties and proof against rapid corrosion. Several special forms of coating have been devised and adopted by many engineers, so as to counteract the rapid corrosion, but these have not, in most cases that have come under my notice, been so far satisfactory, and the life of the pipe has not been proved to be much prolonged through their use. In fact, I have information of some pipes that have been well coated with an excellent mineral rubber asphalt before being laid, and pitting, through corrosion, has almost destroyed their usefulness in a very short term of years. I should be personally obliged to you if I could have your views as to whether you think the subject is one that the Council would consider the advisability of appointing a Committee to report on. I have been carefully studying the matter for some considerable time, and any data I have secured is at the disposal of such Committee, if appointed. I need not say that the question is one which concerns all cities and towns in the Dominion of Canada.

Thanking you in anticipation of an early reply,

I remain,

Yours very truly,

T. A. JARDINE FORRESTER, M. Can. Soc. C.E.
Consulting Engineer New Water Works."

On motion the letter was referred to the incoming Council.

The following letter from Mr. R. W. MacIntyre was read by the Secretary and referred to the incoming Council.

Box 1290, Victoria, B.C.,
January 13th, 1912.

Prof. C. H. McLeod,
Secretary, Can. Soc. C.E.

Dear Sir,

As I shall be unable to attend the Annual Meeting of Can. Soc.

C.E. in Montreal on 24th inst., I beg to submit the following suggestions for consideration, viz.:

There is a great deal of dissatisfaction in the West over the admission of Surveyors as A.M. whose history does not include any engineering experience, nor render them eligible under the Constitution of the Society. I have repeatedly drawn attention to this during the past two or three years, your reply being that the Council were in the habit of admitting applicants who had passed the Surveyors' Examination; this has lost us a number of engineers (British subjects) of undeniable standing in the profession, who preferred to join the American Society, as being strictly a body composed of engineers; the subject was vigorously handled at our recent meeting here in connection with formation of Branch, where out of 18 present, only 6 were connected with Can. Soc., and upon enquiry the above mentioned practice of Council appeared to be the main reason for this state of affairs. I would therefore urge upon the Executive to give the question serious consideration, as to whether we should continue a hybrid Society or a purely Engineering one.

Re admission by examination.

It is to be hoped that the recent ballot will be favourable, but should it not be so, our By-Laws provide for examination, when deemed advisable; yet up to the present no provision has been made to carry out the By-Law, and this is an urgent matter which should be attended to without delay.

In British Columbia, McGill College, Vancouver, is available; in Alberta, the University at Edmonton; in Saskatchewan, the University at Saskatoon, and in Manitoba similar facilities. In addition to this you have members of sufficient standing in most of important western cities to undertake the examination on papers sent up from headquarters, similar to method adopted in connection with D.L.S. examinations throughout Canada.

Re Charter and By-Laws.

We might include a Geographical list of Members to advantage, as printed in the American Society's list for each year, rendering our list easier for reference and more up to date. I have frequently heard this advocated by engineers belonging to both Societies.

Wishing you the Season's Compliments and a successful meeting,

Yours truly,

R. W. MACINTYRE,
M. Can. Soc. C.E.

The following letter from Mr. P. M. Sauder was read by the Secretary:—

"Whereas, the water supplies, water powers, navigation of our rivers, irrigation of our semi-arid lands, drainage of our over-flow and swamp lands and the sanitary conditions of our streams and their water sheds generally are a great asset.

Whereas an accurate knowledge of a flow of water in nearly all important streams is essential for the solution of many problems in connection with navigation, water power, irrigation, domestic and industrial water supplies, mining, bridge building, river channel protection, flood prevention and storage for conservation of flood waters.

Whereas it is the opinion of the Society that the matter of the topographical and hydrographic surveys to determine the location and quantity of water supply and the proper methods of conserving it should be undertaken by the Federal Government.

Therefore be it resolved: That this Society, while recognizing the work already done urges strongly upon the Dominion Government the importance of making the necessary appropriations and providing the necessary staff to undertake in an intelligent and systematic manner the gauging of all streams of water supply and the location and survey of all sites suitable for reservoirs for the storage of water."

On motion by Mr. John Kennedy, seconded by Mr. C. H. Mitchell, this letter was referred to the Committee on Conservation.

Mr. Leofred moved, seconded by Mr. Skaife, that the Council take steps to secure the exemption of members of the Canadian Society of Civil Engineers from service as jurors in the Courts of Justice of the Province of Quebec.

Mr. Holgate — I think it would be rather trying to ask the Council to assist us to escape our duties as citizens. I do not think this proposal should be seriously considered.

Mr. Leofred — Other professional men are exempted from serving as jurors. The land surveyors, and I believe even dentists, are exempt, and I think engineers should be.

Mr. Holgate — If all juries were composed of engineers we would have much better decisions.

The President — Is this a Provincial matter or a Dominion matter?

Voices — It is a Provincial matter.

The President — Then the Quebec Branch should deal with it.

Mr. St. George — I move that this motion be referred to the Quebec Branch, as it is a Provincial matter.

Mr. Parent — MR. PARENT.—Mr. Chairman, if this matter is to be submitted to the Quebec Branch, have we the sympathy of this Society? It is

not only necessary that we have the approval of the Society, but that we have its sympathy.

I am very much in sympathy with what Mr. Holgate has said. I do not think we should set an example of trying to shirk our duty as citizens. I think the standard of the juries of our Courts should be raised, and not debased. Mr. Tye

I will put Mr. Leofred's motion to the meeting. The President

The motion was lost.

The next order of business is the reception of the Reports of the Scrutineers. The President

May I ask a question? Mr. Mackenzie

Certainly. The President

Is there any Committee of the Society in existence now which could consider the subject of the disintegration of concrete surfaces in the intertidal spaces in sea water? If not, then I think the time has arrived when we should have a Committee which would look especially into this matter. It is a question on which there may be some difference of opinion. Mr. Mackenzie

The Committee on Cement and Concrete Specifications has power to deal with this matter, and a large amount of information has been accumulated on the subject, but that information is not yet sufficiently definite to base any report on it. Mr. Jamieson

I agree with Mr. Mackenzie that it is a subject of the very greatest importance, and if the present Cement Committee is not qualified to deal with it, or if it is not within its powers, then another Committee ought to be appointed. Mr. John Kennedy

There is not a more important matter in the engineering profession in this country than this very subject. The Committee referred to must have had power to report on it for some years, and so far as I can find out not very much has been done in the way of assisting the engineers who are building such structures. In the United States engineers who are working along the sea coast have very definite ideas; so much so that they have to a large extent abandoned the use of concrete in sea water, and are using stone instead. Mr. Mackenzie

This is a comparatively new problem, and there are now extensive tests being made regarding it in Germany. The Scandinavian Committee, which is composed of engineers and cement manufacturers, is now conducting a long term test, and a great deal of work is also being done in the United States. We must rely a good deal on the results of these tests. I have got all the data on the subject which is available to date, and I think by next year the Committee will be able to make a definite report.

I beg to say that there are data scattered over this country which have not been collected. There are examples of such work which Mr. Mackenzie

can be seen and the results noted. So far as I know steps have not been taken to collect and utilize them.

Mr. Leofred I move that Mr. Mackenzie be added to the Committee having in charge the study of the effect of sea water on cement work.

Mr. Jamieson The Committee already has power to add to its numbers, and we would be very glad to add Mr. Mackenzie to it.

The President The next order of business is the reception of reports of the scrutineers on By-Laws.

The scrutineers, consisting of Mr. H. B. Stuart, Chairman, and Messrs. J. E. Openshaw and C. E. Meadows, reported that all the amendments to By-Laws submitted to the membership as follows were carried.

To amend By-law No. 8 by adding the following:—

Every candidate who is not a graduate of some School of Engineering recognized by the Council, shall be required to pass an examination before a Board of Examiners appointed by the Council, on the theory and practice of Engineering, and especially in one of the following branches at his option: Railway, Municipal, Hydraulic, Mechanical, Mining, or Electrical Engineering.

To amend By-law No. 9 by adding the following:—

Every candidate who is not a graduate of some School of Engineering recognized by the Council, or has not passed the examinations of the first year in such a course, shall be required to pass an examination in the following subjects: Geography, History (that of Canada in particular), Arithmetic, Geometry, Euclid (Books I-IV. and VI.) Trigonometry, Algebra up to and including quadratic equations.

To amend By-law No. 10 by inserting the following:—

After the words "in which case" in the 8th and 9th lines, "he shall pass an examination equal to that prescribed for admission to the grade of Junior in the foregoing section and"

To amend By-law No. 20 by adding the following:—

Persons elected after six months of any year shall have expired, shall pay only one-half the amount of dues for that year.

To amend By-law No. 55 by striking out the third line and substituting the following:—

"all who were members of the Branch on the date of the previous Annual Meeting and who are not"

The next order of business is the report of the ballot for the election of members. The President

The attention of the meeting should be called to a little informality regarding this report. Mr. McAllister, who acted as the Chairman of Scrutineers, was not elected as the Chairman. The gentleman who was elected did not report, and the Society was out of session before it was noted that he was not attending to business. A substitute had to be got for him, and Mr. McAllister acted as such. Perhaps the meeting would confirm the appointment of Mr. McAllister now. The Secretary

Carried.

Scrutineers' Report of Ballot:—

President	W. F. Tye	By acclamation
Vice-President	L. A. Vallée	116
	H. H. Vaughan	273
Councillors: District No. 1	G. H. Duggan	265
	W. J. Francis	135
	H. G. Kelley	145
	C. N. Monsarrat	215
District No. 2	H. F. Donkin	160
	W. B. Mackenzie	201
District No. 3	A. E. Doucet	230
	E. A. Hoare	150
District No. 4	S. J. Chapleau	141
	D. MacPherson	239
District No. 5	C. L. Fellowes	209
	H. J. Lamb	166
District No. 6	C. H. Dancer	163
	J. A. Hesketh	201
District No. 7	C. E. Cartwright	288
	S. H. Reynolds	77

There were four hundred and five (405) ballots cast.

Respectfully submitted,

WILLIAM J. McALLISTER.
E. MAUER.
J. LINDSAY CARNEGIE.

Montreal, January 26th, 1912.

The President — I have much pleasure in declaring the following gentlemen elected for the coming year: For President, W. F. Tye; for Vice-President, H. H. Vaughan; for Councillors—District 1, G. H. Duggan, C. N. Monsarrat; District No. 2, W. B. Mackenzie; District No. 3, A. E. Doucet; District No. 4, D. MacPherson; District No. 5, C. L. Fellowes; District No. 6, J. A. Hesketh; District No. 7, C. E. Cartwright. I would ask the new President, Mr. Tye, to take the chair.

The new President, Mr. Tye, took the chair amidst applause.

Mr. Tye — Gentlemen, I wish to thank you very much for your kind reception. I can only hope that you will be as well pleased when the year is over.

The Secretary — Mr. President, the matter of the election of a Nominating Committee is one that is to be dealt with under the By-laws by this meeting, the mode of procedure being suggested by the Council. This procedure, in accordance with the practice of the past two years, has been to request the Branches to suggest at least two names for each office, nominations being thus obtained for the Districts 3, 4, 5, 6 and 7. The recommendation with regard to District No. 1, which is the headquarters, has been made by the Montreal members of the Council. A nomination has also been made by the Council for District No. 2, comprising the lower provinces, in which there is no Branch. I have recommendations under these methods for all the Districts except No. 3, and I understand that the representatives of the Quebec Branch here present are prepared to make a nomination.

For District No. 2 Mr. J. L. Allan is nominated. For District No. 1, Mr. R. S. Lea. For District No. 4, Mr. James White. For District No. 5, Mr. T. C. Irving, Jr. For District No. 6, Mr. Frank Lee and Mr. E. P. Fetherstonhaugh. For District No. 7, Mr. J. C. Kennedy, Mr. E. C. Cartwright and Mr. H. L. Dutcher.

The President — Is it your pleasure that you make any additional nomination to District No. 1?

Mr. Jamieson — Is it in order now to discuss this question? This does not seem a satisfactory way of proceeding, and it does not appear to give satisfactory results, inasmuch as there have not been the full members nominated. Why not adopt the procedure of the American Society, which is to send out a paper asking for suggestions from all the members in each of the Districts, and whoever has the greatest number of votes is usually appointed? This method gives every member of the Society an opportunity to suggest a candidate for the Nominating Committee, and we must not lose sight of the fact that the Nominating Committee is a very important body, and one which should be very carefully selected.

I would like to say a word on the subject. If I remember rightly there was a time when circulars were sent out to all members of this Society asking for nominations to the Nominating Committee. The result, as I remember, was that if a man got half a dozen votes he would usually be elected. On one occasion I was proposed as a member of the Nominating Committee for one of the outlying districts, and there were, I suppose, a dozen other names submitted, each of them having one vote. I myself and one other member had two votes, and the tie was left to the decision of the Annual Meeting, with the result that I was elected, I suppose, because I happened to be present. I therefore actually represented two members of the Society on that Nominating Committee. Now, if we send out ballots as Mr. Jamieson suggests, it seems to me we will have the same trouble over again. We will have any number of names suggested and none of them will have an important majority. Mr. Shanly

Well, while that was true in the past, it would not necessarily be true to-day. Conditions have very materially changed. Mr. Jamieson

Is it not more satisfactory to leave it to the Branches and let them decide on whom they want? The President

Under the present system the selection of the members nominated is left as largely as possible to the local Branches. They are supposed to be in touch with their own members, and they can discuss the matter among themselves and send in a ballot which will represent the majority of their members. On the other hand when each member votes independently you cannot get a majority. Mr. Shanly

Each District attends to its own part of the business through its Branch without interference from anybody. The President

Is there a Branch in every district? Mr. John Kennedy

Except at headquarters and the lower Provinces. All the others are covered. The Secretary

The business before this meeting now is the election of a representative for District No. 2. The President

Have you any other names to suggest for District No. 2 in addition to that of Mr. J. L. Allen? Is it your pleasure that Mr. J. L. Allen be the member for District No. 2?

Carried.

Now, for District No. 1, Mr. R. S. Lea. The President

Carried.

For District No. 3. The President

I am authorized by the Quebec Branch to propose the name of Mr. E. A. Hoare. Mr. P. E. Parent

Carried.

For District No. 4 Mr. James White has been suggested. The President

Carried.

For District No. 5? The President

Prof. Haultain — I move that Mr. T. C. Irving, Jr. be appointed.

Carried.

The President — For the Manitoba District, No. 6, the names of Mr. Frank Lee and Mr. Fetherstonhaugh are suggested.

Mr. Legrand — I beg to move that Mr. Frank Lee be appointed.

The President — All in favor of Mr. Frank Lee please stand up.

Carried unanimously.

The President — For District No. 7, the Vancouver Branch, the names of Mr. J. C. Kennedy, Mr. C. E. Cartwright and Mr. H. L. Dutcher have been suggested.

The Secretary — Mr. Cartwright is not eligible as he is a member of Council.

The President — All in favor of Mr. J. C. Kennedy will please stand up.

Carried.

The President — The only other business is to pass votes of thanks to the Railways of the Eastern Passenger Association, the Canadian Pacific Railway, the Montreal Tramways Company, the Dominion Bridge Company, the Canada Car Company, the McGill University and Dr. Barnes.

Mr. Monsarrat — I have very much pleasure in moving a hearty vote of thanks to be offered to these various companies and institutions, and to Dr. Barnes.

Mr. Legrand — I second the motion.

Carried unanimously, amidst applause.

Mr. Jamieson — Might I move that the Nominating Committee should in future be elected by ballot by the members at large from each District—that the members in each District should vote by ballot on their nominee for the Nominating Committee? In other words that the Secretary of each District should suggest the names.

The President — Is not that an amendment to the By-laws?

Mr. Jamieson — Yes, I presume that would come in as an amendment to the By-laws.

The President — Your motion is not in order. You will have to give notice of your proposal to amend the By-laws before the first of October next, so that it may be voted on at the next Annual Meeting.

Mr. Keefer — There is one motion I would like to make, and that I have very great pleasure in making. It is to thank the retiring officers of the Society for the very able manner in which they have discharged their duties.

Carried, amidst applause.

Mr. Rust — Mr. President and gentlemen, on behalf of the retiring officers and myself, I wish to thank you very much for the kind way in which this vote has been proposed. We did the best we could, and that is about all I have to say.

Mr. Lindsay — I feel, as one of the visiting members, that I voice the sentiment of all of the visiting members in expressing our appreciation of the

kindness extended to us by the Montreal members. As an Irishman I suppose I wear my heart on my sleeve, but I am sure you have all made us very much at home here, and I assure you I appreciate it very much.

As a good Frenchman I second the motion. Mr. Legrand

I declare the meeting adjourned. The President

The Canadian Society of Civil Engineers

176 Mansfield Street, Montreal.

Established Feb. 24th, 1887. Incorporated by Dominion Act, June 23rd, 1887 (50 Vic., Cap. 124).

REPORT

OF

ANNUAL MEETING

1913

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Volume XXVII

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The Canadian Society of Civil Engineers

REPORT OF PROCEEDINGS OF THE TWENTY-SEVENTH ANNUAL MEETING, HELD AT THE ROOMS OF THE SOCIETY, 413 DORCHESTER STREET WEST, MONTREAL, 28TH TO 30TH JANUARY, 1913.

The President, Mr. W. F. Tye, in the Chair.

MORNING SESSION, 28TH JANUARY, 1913.

The President called the meeting to order at 10.30 A.M. The President

The minutes of the last Annual Meeting were read by the Secretary and confirmed.

The President stated that he had been requested to call the attention of members to the Introduction and Reception Committee, which had been appointed in accordance with the instructions of the last annual meeting; that the members of the Committee were:—Mr. J. A. Jamieson, Mr. Lewis Skaife and Mr. Walter J. Francis, and that these gentlemen whose badge numbers were 14, 15 and 16, would be glad to do anything in their power for those in attendance at the meeting. The President

The following gentlemen were elected scrutineers on the nomination of the President:—

For the election of officers etc.:—Messrs. James Ewing, S. Blumenthal, A. R. Ketterson, G. E. Fiset and H. E. Bates.

For Amendments to By-Laws Committee:—Messrs. J. E. Openshaw, M. A. Downes and G. E. L. Mallory.

For Specifications:—Messrs. E. S. M. Lovelace, C. N. Shanly and S. E. Oliver.

The Report of the Council, having been distributed in advance of the meeting, was taken as read and received.

REPORT OF THE COUNCIL FOR THE YEAR 1912

The Council presents the following report on the work of the Society during the past year.

Roll of the Society

The following elections took place: Twenty-seven Members, eighty-four Associate Members, two Associates, fifty-eight Juniors and fifty-six Students.

One Associate Member was reinstated.

Transfers were made as follows: Twenty-three Associate Members to the class of Members; one Associate, six Juniors, and ninety-four Students to the class of Associate Members; and forty-five Students to the class of Juniors.

There were thirty-five deaths.

At present the membership stands as follows:

Hon. Members	13
Members	585
Associate Members	1,186
Associates	37
Juniors	158
Students	1,029
Total	3,008

Annual Meeting

The twenty-sixth Annual Meeting was held at 413 Dorchester Street West, Montreal, on the 24th, 25th and 26th January, 1912, under the presidency of Mr. C. H. Rust.

The first session was called to order on Wednesday, January 24th, at 10 a.m., and the meeting was adjourned on Friday, January 26th.

Meetings

The Council has held seventeen meetings during the year. There have been eight sectional meetings and six general or monthly meetings of the Society.

The following papers and addresses were presented:

General Section and Monthly Meetings:

"Iceberg Detection in Navigation," by Dr. H. T. Barnes. (Read

in the Lecture Hall of the Chemistry Building, McGill University, during the Annual Meeting.)

"A Short Sketch on the Development of Transportation Facilities in Canada," by Mr. Collingwood Schreiber, C.M.G., Hon.M.Can.Soc.C.E.

"The Little Salmon River Viaduct," by Mr. R. F. Uniacke, M.Can. Soc.C.E.

"Embankments and Foundations," by Mr. A. C. Oxley, A.M.Can. Soc. C.E.

"Rope Drive Transmission," by Mr. Edwin Kenyon of the firm of William Kenyon & Sons, Dukinfield, England.

"The Current Meter Rating Station at the Irrigation Office, Department of the Interior, Alberta," by Mr. F. H. Peters, A.M.CanSoc..C.E.

"Hydro-Electric Plant of the Sherbrooke Railway and Power Company," by Mr. C. L. Cate, A.M.Can.Soc.C.E.

"The Protection of the Foreshore at Dallas Road, Victoria, B.C.," by Mr. G. N. Duncan, Junior, Can.Soc.C.E.

"Rotary Snow Plows," by Mr. H. H. Vaughan, M.Can.Soc.C.E.

Electrical Section:

"High Voltage Insulation," by Mr. Alex. Gray, A.M.Can.Soc.C.E., and Mr. Andrew McNaughton. (Read and experimentally illustrated in the High Tension Laboratory, Macdonald Engineering Building, McGill University.)

"Transmission Line Design," by Mr. Julian C. Smith, M.Can.Soc. C.E.

Mechanical Section:

"Distribution of Stress in Certain Tension Members," by Mr. C. Batho, A.M.Can.Soc.C.E.

"Patent Law from an Engineer's Standpoint," by Mr. Russel S. Smart, A.M.Can.Soc.C.E.

Mining Section:

"Lead Smelting Methods and Conditions at Nelson, B.C.", by Mr. G. St. G. Sproule, Junior, Can.Soc.C.E., with special discussion of Lead Smelting Processes in General, by Dr. A. Stansfield, A.Can.Soc.C.E.

Branch Societies

The several branches of the Society are as follows:

Vancouver —Headquarters, McGill College University.
Chairman, C. E. Cartwright.
Secy.-Treas., H. B. Fergusson.

Victoria —Headquarters, City Hall, Victoria
Chairman, F. C. Gamble.
Secy.-Treas., R. W. Macintyre.

Manitoba —Headquarters, University of Manitoba, Winnipeg.
Chairman, J. A. Hesketh.
Secy.-Treas., E. E. Brydone-Jack.

Toronto —Headquarters, Engineers' Club, King Street West.
Chairman, T. C. Irving, Jr.
Secy.-Treas., T. R. Loudon.

Ottawa —Headquarters, 177 Sparks Street.
Chairman, S. J. Chapleau.
Secy.-Treas., H. V. Brayley.

Kingston —Headquarters, School of Mines, Queen's University
Chairman, A. K. Kirkpatrick.
Secy.-Treas., L. W. Gill.

Quebec —Headquarters, City Hall, Quebec
Chairman, W. D. Baillairge.
Secy.-Treas., A. Amos.

Committees

The following have been the Committees of Council during the year:

Library and House Committee:

F. P. Shearwood, Chairman.
James White.
L. A. Herdt.
R. S. Lea.
J. M. R. Fairbairn.

Finance Committee:

J. M. Shanly, C. N. Monsarrat. } Chairmen.
G. H. Duggan.
W. J. Francis.
E. Marceau.

The Gzowski Medal Committee:

R. S. Lea, Chairman.
E. E. Brydone-Jack.
W. J. Stewart.
A. E. Doucet.
J. Galbraith.

Officers of Sections

General:

H. Holgate, Chairman.
D. MacPherson, Vice-Chairman.

Electrical:

L. A. Herdt, Chairman.
R. M. Wilson, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
H. M. Jaquays, Vice-Chairman.

Educational Committee:

E. Marceau, Chairman.
H. Holgate.
L. A. Herdt.
J. M. Shanly.
C. H. McLeod.

Committee on Papers:

G. H. Duggan, Chairman.
G. A. Mountain.
John Murphy.
J. M. R. Fairbairn.
R. J. Durley, Secretary.

Committee on Meetings:

Henry Holgate, Chairman.

The officers of Sections together with the Chairmen and Vice-Chairmen of Branches.

The following have been the Committees of the Society during the year:

The Nominating Committee for Officers and Members of Council for the year 1913:

R. S. Lea, Chairman, representing Dist. No. 1.
G. A. Mountain, H. N. Ruttan, C. H. Rust, } Past Presidents.
J. L. Allan, Representing District No. 2.
E. A. Hoare, " " " 3.
James White, " " " 4.
T. C. Irving, Jr., " " " 5.
Frank Lee, " " " 6.
J. C. Kennedy, " " " 7.

Railway Ties:

D. MacPherson.
H. D. Lumsden.
F. P. Gutelius.
H. G. Kelley.
Wm. McNab.
J. G. Sullivan.
T. C. Burpee.
H. A. Woods.
A. F. Stewart.
M. H. MacLeod.
W. A. Bowden.
W. B. MacKenzie.

Transportation Routes:

John Kennedy, Chairman.
C. R. Coutlee.
Wm. McNab.
E. D. Lafleur.
F. W. Cowie.
J. A. Jamieson.
M. H. MacLeod.
C. H. Keefer.

Roadbed and Ballasting:

J. G. Sullivan, Chairman.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
T. C. Burpee.
W. B. Mackenzie.
B. B. Kelliher.
H. A. Woods.
M. H. MacLeod.
L. A. Vallee.
R. McColl.

Rail Fastenings and Tie-Plates:

Howard G. Kelley, Chairman.
H. Holgate.
H. D. Lumsden.
F. P. Gutelius.
W. McNab.
J. G. Sullivan.
T. C. Burpee.
A. Stansfield.
B. B. Kelliher.
A. F. Stewart.
L. A. Vallee.
H. A. Woods.
R. McColl.

Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.

Improved Engineering Service:

H. Holgate, Chairman.
A. W. Campbell.
J. A. Jamieson.
F. L. Wanklyn.
G. J. Desbarats
A. St. Laurent.
L. A. Vallee.
H. J. Lamb.

Establishment of Testing Laboratories:

C. H. Keefer, Chairman.
J. Galbraith.
H. M. Mackay.
Phelps Johnson.
J. A. Jamieson.
P. Gillespie.
G. E. Perley.

Usefulness of the Society and Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Sewage Disposal, Etc.:

R. S. Lea, Chairman.
Willis Chipman.
J. S. Dennis.
C. E. W. Dodwell.
John Kennedy.
R. W. Leonard.
C. H. Keefer.
C. R. Coutlee.
E. J. Walsh.
H. N. Ruttan.
C. H. Rust.
T. A. Murray.
W. M. Edwards.

Special Committee Re Sewage Disposal to confer with Dominion Government:

John Kennedy.
Willis Chipman.
R. S. Lea.

Conservation:

James White, Chairman.
C. R. Coutlee.
H. F. Laurence.
R. McColl.
R. O. Sweezey.
W. H. Breithaupt.
G. A. Bayne.
A. J. MacPherson.
J. S. Dennis.
J. B. Hegan.
C. E. W. Dodwell.
A. E. Doucet.
R. S. Lea.
R. W. Leonard.
E. E. Brydone-Jack.
W. R. W. Parsons.
John Chalmers.
T. H. Tracy.

Good Roads:

A. W. Campbell, Chairman.
H. N. Ruttan.
R. McColl.
G. G. Powell.
W. D. Ballairge.
A. F. MacAllum.
W. A. McLean.
C. E. Cartwright.

Steel Bridge Specifications:

C. N. Monsarrat, Chairman.
F. P. Shearwood.
J. G. LeGrand.
R. F. Uniacke.
G. H. Duggan.
N. M. McLeod.
H. G. Kelley.
W. A. Bowden.
P. B. Motley.
F. C. McMath.

The Electro-Technical Commission:

L. A. Herdt, Chairman.
O. Higman.
H. T. Barnes.
L. W. Gill.
W. A. Duff.
L. A. Rosebrugh.
J. Kynoch.
J. Murphy.
A. B. Lambe.

Medal and Prizes

The awards of the Gzowski Medal and of prizes for the best students' papers will be made known during the meeting.

The following is a statement of elections which have taken place since the issue of Bulletin No. 8:

October 12th, 1912

Members:

Brown, S. P.
Canavan, H. W. E.
Evans, J. D
Press, W. J.

Associate Members:

Dawe, R. G.
Cooper, H.
Emery, F. E.
Greene, W. H.
LeCointe, P. L. P.
McGugan, D. J.
Mitchell, B. F.
Partik, C. R.
Taylor, C.
Underwood, J. E.

Juniors:

Bathen, J.
Dupuis, L. C.
Laberge, J. H. L.
Mackenzie, J. A.
MacQuarrie, E. M.
Stewart, J. C.
Watson, M. B.

Students:

Aykroyd, M. J.
Chadwick, F. G.
Cimon, H.
Gear, G.
Shannon, R. E.
Traversy, V. I.
Willis, W. K.
Wilson, C. P.
Wilson, N.

Transferred from Associate Member to Member:

Dufresne, J. C.
MacFarlane, M. C.

Transferred from Student to Associate Member:

Carty, E. G.
Dawson, F. J.
Hogg, T. H.
Howe, J. P.
Johnston, J. T.
King, J. L.
MacKenzie, M.
Mills, F. O.
Tremblay, T. L.

Transferred from Student to Junior:

Dechesne, L. M.
Duncan, G. M.
Goudie, W. D.
Jobidon, P. L.
Mendelssohn, J.

November 9th, 1912

Member:

Welby, A. E.

Associate Members:

Bowman, E. P.
Collingwood, C.
Cookson, C. H.
Dalemont, J. E.
DuCane, C. G.
Elmont, V. J.
Fiegehen, E. G.
Harkness, A. H.
Meade, A. de C.
Moncton-Case, J.
Moretti, C. E. P.
Oborn, S. M.
Rime, L. M. H.
Sahlstrom, G.
Seymour, H. L.

Juniors:

Campbell, C. D.
Caron, G. J.
Dansereau, J. A.
Fournier, A.
Hudson, G. M.
Kemp, M. A.
Lyon, E. N.
MacDonald, W. C.
MacLeod, G. K.
McIntyre, A. G.
McKnight, A. W.
Pinkerton, P. W.
Searancke, F. K.
White, R.

Students:

Elliott, J. A.
Massue, J. G. H.
Page, J. A.
Scott, W. D.
Wilson, W. J.

Transferred from Associate Member to Member:

Chace, W. G.
Cook, A. S.
Rath, A. C. D.

Transferred from Student to Associate Member:

Barclay, M. D.
Beale, A. M.
Black, W. D.
Burbidge, G. H.
Cameron, J. S.
Chestnut, F. H.
Finlayson, J. N.
Flint, C.
Fraser, A.
Hill, B. M.
Kemp, J. C.
McDougall, G. K.
McGiverin, F. A.
Mulock, R. H.
Pinch, H. H.
Powell, A. T.
Rolfson, O.
Rowley, H. G.
Shearer, G. W.
Silliman, J. M.
Stavert, W. D.
Tyrrell, W. G.
Walker, W. J.
Williams, F. H.
Wyman, J. K.

Transferred from Student to Junior:

Adams, W. D.
Boast, R. G.
Child, C. G.
Cline, C. G.
Cockburn, L. S.
MacGregor, A. E.
MacLeod, G. W.
MacNearney, C. A.
Michaud, J. A.
Mignault, L. O.
Miller, H. B.
Milot, J. A.
Papineau, A. J.
Ruggles, T. D.
Salter, E. M.
Vinet, E.
Watson, J. P.
Wetmore, F. W. C.
Youngman, W.

December 14th, 1912

Associate Member:

Payne, C.

Junior:

Taylor, G. R.

Students:

Fleming, D. H.
Fullerton, J. T.
Garden, H. M. G.
Hall, J. S.
Kearns, J. A.
Moreau, J.
Steeves, J. T.
Stinson, J. N.

Transferred from Student to Associate Member:

Beauchemin, A. O.
Greene, P. W.
Price, T. E.
Stanley, J. N.

Transferred from Student to Junior:

Affleck, G.
Dixon, A.
Key, W. R.
Midgley, F. H.
Vallee, J. I.

January 11th, 1913

Members:

Heyerdahl, T.
Powell, A.
Swain, G. F.

Associate Members:

Chadwick, R. E.
Corrie, W. E.
Doty, J. W.
McLeod, H. W.
Snodgrass, R.
Stiles, J. A.
Whitman, J. B.

Juniors:

Ferguson, J.
Graham, F. J.
Harcourt, H. E.
Howe, B. F.
Hunter, L. McL.
Janney, W. E.

Students:

Jack, H. C.

Transferred from Associate Member to Member:

Ambrose, J. R. W.
Gwyer, W. K.

Transferred from Junior to Associate Member:

Fetterly, P. A.
Wickenden, A. A.

Transferred from Student to Associate Member:

Baird, J. B.
Bates, H. E.
Cowper, G. C.
Davis, F. M.
Hays, C. L.
Mackay, A. G.
Openshaw, J. E.
Ortiz, H. T.
Paulin, F. W.
Sailman, R. T. H.
Smith, G. W.
Tate, H. W.

Transferred from Student to Junior:

Duff, M. O.
Feeney, J. L.
Kortright, F. H.
Paquette, H. A.
Shackell, S. W.
Trotter, C. T.
Vallee, J. I.

General

Two volumes of *Transactions* were published during the year, namely, Volume II. for 1911, and Volume I. for 1912. Bulletin No. 8, giving notes as to elections etc., has also been published.

As will be observed from the list given on page 3, a new Branch of the Society was established during the year in Victoria, B.C. It was found necessary to make a special adjustment of the boundaries of the two British Columbia Branches, restricting the Vancouver Branch to the mainland and the Victoria Branch to the island of Vancouver. These sections of the Society have entered on a vigorous campaign for the exclusion of alien engineers from appointments to important permanent positions, and as a result of their agitation the Council has addressed the following letter to the Premier of Canada, the Premier of British Columbia, and the Ministers of Public Works and of Railways and Canals :—

Montreal, November 5th, 1912.

"Sir:—

"I have the honour to inform you that at a special meeting of the Council of the Canadian Society of Civil Engineers held in Montreal on the 31st day of October last, sundry communications were received from

members of the Society residing in Western Canada, complaining and protesting against the employment of alien engineers on public works and requesting the Society to represent to the various authorities and Governments its views in regard thereto. It would appear from the representations made that two important engineering positions in British Columbia—one being that of Engineer of the City of Victoria for the construction of water works, the other that of Engineer of the Provincial Government in charge of the improvements of Strathcona Park—have recently been filled by engineers from the United States. The Council is also informed that there is under the consideration of the Dominion Government the appointment of a citizen of the United States to undertake the preliminary work in connection with the Seymour Narrows Bridge project.

These matters have aroused much ill feeling amongst Canadian engineers in the West, as is evinced by their communications to the Society.

After a full consideration of the representations made, it was resolved that while the Council, acting on behalf of this Society, has no desire to suggest that important engineering positions should be filled by any but the most competent and experienced men available it is strongly of opinion that in as far as possible every opportunity should be given to Canadian engineers to carry out the engineering works of the Dominion.

The Council would, therefore, respectfully suggest that all engineering appointments should be given most careful consideration with a view, if possible, to securing available Canadian engineers for important projected public works."

"I am, Sir,

Yours very truly,

(Signed) C. H. McLEOD,

Secretary."

The Council found it impossible to carry out, to the letter, the instructions of the last Annual Meeting in the matter of submitting the Specifications on Roadbed and Ballasting, Stone and Gravel Roadways, and Steel Railway Bridges to the Membership, but it is hoped that ample time was afforded for the full consideration of these important specifications and that, with any minor modifications which may be found advisable, they may now be adopted for the guidance of Canadian engineers in the departments of the profession to which they relate.

In conformity with the By-Laws regarding admission to the several grades of membership, a complete scheme of examinations has been drafted and the necessary Board of Examiners formed under the guidance of the Educational Committee. Special attention is directed to the report of this Committee and to the appended report of the Examination Board.

Under the instructions of the Annual Meeting the sale of the building No. 413 Dorchester Street was promptly completed, and after duly considering the advantages and cost of properties in various localities in the City the lot and house No. 176 Mansfield Street was procured for the sum of $47,100. A new structure has been erected on the rear portion of the lot and the existing house remodelled to suit the present requirements of the Society. The plan adopted has in view the removal of the old building and erection of a new structure on its site when the increased requirements of the Society shall demand additional accommodation. Bulletin No. 8, issued in June last, gave floor plans of the combined structure. The building, which is now nearing completion, will cost $39,700, making the total expenditure for building and lot $86,800. To this is to be added a sum of $4,000 for furnishings, equipment etc.

On the invitation of the Institution of Civil Engineers the Society has co-operated with the Engineering Societies of Great Britain and America towards the erection of a suitable memorial to the late distinguished engineer and man of science, Lord Kelvin. The subscriptions received from members of this Society who have not contributed through other sources have amounted to $272.

During the year the Society has been officially represented at various engineering and scientific Congresses, the most notable of which was the International Congress of Navigation. An important section of this Congress visited Canada at the close of the meetings. Attention is called to the official report of the Secretary, who represented this Society at the meetings and subsequently took charge of the Canadian Excursion.

The Western Canadian Irrigation Association held its Sixth Annual Convention at Kelowna, B.C., and was attended by Messrs. A. S. Dawson, P. J. Jennings, J. C. Kennedy, F. H. Peters and P. M. Sauder on behalf of this Society.

A meeting of the International Congress of Applied Chemistry, at which the Society was represented by Messrs. F. K. Thomson and Allen Hazen, was held in New York and Washington in August.

An Engineering Congress of the Societies of the World, in which the Canadian Society is invited to co-operate, will be held in San Francisco in 1915. Although there has been no definite undertaking the occasion is looked forward to as one with which Canadian engineers might well identify themselves.

The competition for prizes for the best essays on "The Creation of a Scientific Body of Men," notice of which was sent to all members, has resulted in the selection of two articles which in the opinion of the judges are highly meritorious. The object which these essays are intended to serve is the advance of public opinion regarding the Civil Service reorganization, now under discussion, and in which the Society has endeavoured to interest the Dominion Government.

W. F. TYE, President.

13th January, 1913. C. H. McLEOD, Secretary.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

Although the Library Committee has not held many meetings during the past year, it has not been altogether inactive. In December, 1912, it was agreed to transfer the Crerar Card Catalogue to McGill University on the understanding that it would be kept up-to-date at the expense of the University and would always be available for reference by the members of this Society.

In view of the fact that the Society is preparing for removal to the new building on Mansfield Street, it was thought advisable to destroy some of the old magazines in the basement of the present building, and as the Trade Catalogue has not been kept up to date it was considered to be of no further use and the Committee ordered the card index in connection therewith to be discontinued.

During the year the following books have been presented or purchased. The sum of $49 has also been contributed for the purchase of books.

By Purchase

"Structural Engineering." By Joseph Husband and William Harby. O. Linen, pp. 396. 337 diagrams. London, New York, Bombay and Calcutta, 1911.

"Centrifugal Pumps, their design and construction." By Louis C. Loewenstein and C. P. Crissey. O. Linen, pp. 435. Illustrated. 8 Plates. New York, 1911.

"Municipal Franchises." By D. F. Wilcox. Vol. II. Transportation Franchises, Taxation and Control of Public Utilities. O. Linen, pp. 885. New York, 1911.

"A Treatise on the Design and Construction of Mill Buildings and other Industrial Plants." By H. G. Tyrrell. O. Linen, pp. 490. Chicago, New York and London, 1911.

"Handbook of Cost Data for Contractors and Engineers." By H. P. Gillette. Second Edition. D. Leather, pp. 1854. Chicago and New York, 1910.

"Practical Shaft Sinking." By F. Donaldson. O. Bds., Illus., pp. 143. New York and London, 1910.

"Reinforced Concrete." By J. P. Brooks. O. Bds., Illus., pp. 220. New York and London, 1911.

"Framed Structures and Girders." Vol. I. Stresses Part I. By E. Marburg. O. Bds., pp. 540. New York and London, 1911.

"Kinetic Theory of Engineering Structures." By D. A. Molitor. Sq. O. Bds., pp. 366. New York and London, 1911.

"Theory of Structures." By C. M. Stopford. O. Linen, pp. 411. New York and London, 1911.

"The Width and Arrangement of Streets." By C. M. Robinson. O. Bds., Illus., pp. 199. New York and London, 1911.

"The Port of Hamburg." By E. J. Clapp. O. Cl., Ill., pp. 220. New Haven and London, 1911.

"The Metallurgy of Steel." By F. W. Harbord and J. W. Hall. O. Bds., Ill. 2 Vols. London, 1911.

PRESENTED

"The Life and Life-work of Charles B. Dudley." Memorial volume pub. by the Amer. Soc. for Testing Materials. O. Linen, pp. 269. Illus.
Presented by THE AMER. SOC. FOR TESTING MATERIALS.

"The History of Bridge Engineering." By H. G. Tyrrell. O. Bds., Illus., pp. 478. Chicago, 1911.
Presented by THE AUTHOR.

"Text Book of Topographical and Geographical Surveying." By C. F. Close. I. Linen, pp. 288, Illus. London, 1905.
Presented by F. G. ALDONS, A. M. Can. Soc. C. E.

"Hydraulics, with Working Tables." By E. S. Bellasis. Second Edition. Nar. O. Bds., pp. 311. London, 1911.
Presented by H. A. PAQUETTE, S. Can. Soc. C. E.

"Elementary Lectures on Electric Discharges, Waves, Impulses and other Transients." By C. P. Steinmetz. O. Bds., Illus., pp. 149. New York and London, 1911.
Presented by R. B. YOUNG, S. Can. Soc. C. E.

"Elements of the Differential and Integral Calculus." (Revised Edition.) By W. A. Granville. O. Bds., pp. 463. Boston, New York, Chicago and London, 1911.
Presented by H. I. MORRIS, S. Can. Soc. C. E.

"Sewage Sludge." By F. Spillner. O. Bds., pp. 272. New York and London, 1911.
Presented by C. S. ROBERTSON, S. Can. Soc. C. E.

"Les Bons Chemins a la Campagne." Par Raoul Rinfret. S. Bds., pp. 96. Illus. Montreal, 1912.
Presented by THE AUTHOR.

"Quick Rules for Heating and Ventilating." By W. J. Baldwin Jr. O. Bds., pp. 25. New York.
Presented by THE AUTHOR.

"An Investigation of the Coals of Canada." Conducted at McGill University for Dept. of Mines. Vol. I., pp. 235, Vol. II., 189. Q. Linen, Ottawa.
Presented by THE DEPT OF MINES.

"Reinforced Concrete Construction." By H. Adams and E. R. Matthews. O. Bds., Illus., pp. 310. London, New York, Bombay and Calcutta. 1911.

Presented by E. A. CRAWLEY, Jun. Can. Soc. C. E.

"Geodetic Surveying and the Adjustment of Observations." By E. L. Ingram. O. Bds., Illus., pp. 389. New York and London, 1911.
Presented by J. J. SALMOND, Assoc. Can. Soc. C. E.

"The Mechanics of Machinery." By A. B. W. Kennedy, D. Bds., Illus., pp. 664. London and New York, 1902.
Presented by R. G. LEE, S. Can. Soc. C. E.

"Report on the Building and Ornamental Stones of Canada." By W. A. Parks (Dept. of Mines). Vol. I., O. Cl., Illus., pp. 365. Ottawa, 1912.
Presented by THE DEPT. OF MINES.

"Electrical Injuries." By C. A. Lauffer, M.D. S. Linen., Illus., pp. 77. New York and London, 1912.
Presented by E. M. RENOUF PUB. CO.

Presentations have been made by the following members:—

Aldous, F. G., A. M. Can. Soc. C. E.
Cardaillac, G. de, S. Can. Soc. C. E.
Crawley, E. A., J. Can. Soc. C. E.
Duff, M. O'R., S. Can. Soc. C. E.
Fellows, A. C., M. Can. Soc. C. E.
Guimont, M., A. M. Can. Soc. C. E.
Lee, R. G., S. Can. Soc. C. E.
Marriott, E. G., A. M. Can. Soc. C. E.
McColl, G. B., A. M. Can. Soc. C. E.
McNeil, H., S. Can. Soc. C. E.
Morris, H. I., S. Can. Soc. C. E.
Paquette, H. A., S. Can. Soc. C. E.
Rinfret, R., A. M. Can. Soc. C. E.
Robertson, C. S., S. Can. Soc. C. E.
Salmond, J. J., Associate, Can. Soc. C. E.
Webster, H., M. Can. Soc. C. E.
Young, R. B., S. Can. Soc. C. E.

The following is a complete list of periodicals, magazines, transactions, etc., regularly received and on file in the Library.

Those marked † are paid for; all others are exchanges.

Those marked * are bound at the end of each year, and placed on the shelves in the General Reading Room.

American Architect, *New York.*
*American Society of Civil Engineers, Transactions and Proceedings, *New York.*
*American Society of Mechanical Engineers, Transactions, *New York.*
*American Society for Testing Materials, *Philadelphia.*

American Institute of Architects, Quarterly Bulletin, *Washington.*
*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*
*American Institute of Mining Engineers, Transactions, *Philadelphia.*
American Railway Engineering Association, *Chicago.*
American Water Works Association.—Proceedings.
Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico.*
"Antonio Alzate" Scientific Society, Transactions, *Mexico.*
Australian Inst. of Mining Engrs.
Armour Institute of Technology.
Association of Engineering Societies, Journal of, *New York.*
Association of Ontario Land Surveyors, Annual Report, *Toronto.*
Barge Canal, Bulletin, *New York.*
Bibliographie des Sciences et de l'Industrie, *Paris.*
Board of Water Supply of the City of New York, *New York.*
Boletin de Ingenieros, *Mexico.*
Boston Public Library, Bulletin and Annual Report, *Boston.*
Boston Society of Civil Engineers, *Boston.*
Brooklyn Engineers' Club, Proceedings, *Brooklyn.*
Builders' Bulletin, *Montreal.*
Bureau of Railway Economics, *Washington.*
Bureau of Standards, Bulletin, *Washington.*
Bureau of Mines, *Washington, D.C.*
Bureau of Mines, Report, *Canada.*
Canadian Engineer, *Toronto.*
Canadian Electrical News, *Toronto.*
*Canadian Institute, Transactions, *Toronto.*
Canadian Machinery and Manufacturing News, *Toronto.*
†Canadian Magazine, *Toronto.*
Canadian Manufacturer, *Toronto.*
Canadian Mining Institute, Transactions, *Montreal.*
Canadian Mining Journal, *Montreal* and *Toronto.*
Canadian Municipal Journal, *Montreal.*
Canadian Patent Office Record, *Ottawa.*
Canadian Railway and Marine World, *Toronto.*
Carnegie Library of Pittsburg, *Pittsburg.*
Cassier's Magazine, *New York.*
Cement Record, *Kansas City, Mo.*
"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*
†Century, The, *New York.*
†Chambers' Journal, *London, Eng.*
Cincinnati Public Library, *Cincinnati.*
Cleveland Engineering Society Journal and Transactions, *Cleveland.*
*Cleveland Institute of Engineers, Transactions, *Middlesborough.*
Colorado School of Mines, Bulletin, *Golden, Col.*

Construction, *Toronto.*
Contract Record, *Toronto.*
Cornell Civil Engineer, *Ithaca, N.Y.*
Crerar Library Reports, *Chicago.*
Dept. of Colonization, Mines and Fisheries, *Quebec.*
Department of Marine and Fisheries, *Ottawa.*
Department of Mines, *Ottawa.*
Dept. of Naval Service, *Canada.*
Department of Public Works, *Ottawa.*
Department of Railways and Canals, *Ottawa.*
Department of the Interior, *Ottawa.*
Electric Journal, *Pittsburg.*
†Electric Railway Journal, *New York.*
Electrical Review and Western Electrician, *Chicago.*
Electrical Review, *London, Eng.*
Electrical World, *New York.*
Engineers' Club, *Baltimore.*
*Engineers' Club of Philadelphia, Proceedings, *Philadelphia.*
*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*
Engineering & Contracting, *Chicago.*
*Engineering News, *New York.*
Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*
Engineering Standards Committee Reports, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
Harbour Commissioners' Report, *Montreal.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieur, *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Magazine, *Cleveland.*
Industrial Engineering and the Engineering Digest, *New York.*
Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*

*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Conciliation, *New York.*
International Electro Technical Commission, *London, Eng.*
International Waterways Commission, *Ottawa.*
Interstate Commerce Commission, *Washington, D.C.*
†Iron Age, *New York.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumiere Electrique, *Paris.*
La Technique Moderne, *Paris, France.*
*Liverpool Engineering Society, Transactions, *Liverpool.*
†London Magazine, *London.*
A Magyar Mernok-es Epitesz-Egylet, *Budapest*
Machinery, *New York.*
Marine Review, *Cleveland, Ohio.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*
Mines and Methods, *Salt Lake City, Utah.*
Mining and Metal. Soc. of America.
Mines and Minerals, *Scranton.*
*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Motor Car Journal, *London, Eng.*
Municipal Engineering, *Indianapolis.*
New Orleans Sewerage and Water Board, Report, *New Orleans.*
New York Department of Health, *New York.*
New York Ry. Club, *New York* (*presented by* Mr. VAUGHAN).
North of England Institute of Mining and Mechanical Engineers, *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle.*
Nova Scotia Institute of Science, *Halifax.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
†Power, *New York.*
Providence, City of, Annual Report, *Providence.*
Professional Memoirs, Corps of Engineers, U. S. Army.

Public Health Journal, *Toronto.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*
Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railway Journal of Canada, *Toronto.*
Railway Age Gazette, *Chicago.*
Railway Master Mechanic, *Chicago, Ill.*
Revista Technologico Industrial, *Barcelona.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng.*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*
Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*
School of Mines, Quarterly, Columbia College, *New York.*
†Scribner's, *New York.*
†Sketch, *London, Eng.*
Smithsonian Institution, Reports, *Washington.*
Societe Scientifique Industrielle de Marseilles, *Marseilles.*
Societe Industrielle de l'Est, *Nancy, France.*
Societe Industrielle du Nord de la France, *Lille, France.*
Societe des Ingenieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
The Steamship, *London.*
Technical Index, *London, Eng.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Army, Corps Engineers—Professional Mem., *Washington, D.C.*
U. S. Army—Report, Chief Engineer, *Washington, D.C.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*
Valve World.

Western Australian Institution of Engineers, *Perth, Australia.*
*Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*
Zeitschrift fur Architecten u. Ingenieurwesen, *Hanover.*
Zeitschrift des Osterreichischen Ingenieur u. Architekten Vereines, *Vienna.*

University Publications:

Dalhousie University, Calendar, *Halifax.*
McGill University, Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal.*
University of Illinois, Bulletin, *Urbana, Ill.*
University of North Dakota, Quarterly Journal, *North Dakota.*
University of Toronto, Trans. Engineering Soc., *Toronto.*
University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

It was agreed to exchange publications with the following in addition to the above:—"Ferro Concrete" (London), Sociedad Cubana de Ingenieros, Publications of Engineering Department of the University of Manitoba, and the Bureau of Railway Economics.

It was also arranged to classify Mr. Lefebvre's works which had been presented to the Society in 1911.

Respectfully submitted,

F. P. SHEARWOOD,

Chairman.

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1912

Receipts

SUBSCRIPTIONS—		
Arrears	$2,887.05	
Current	13,897.10	
Advance	158.30	
Entrance Fees	4,077.00	
		$21,019.45
INTEREST—		
Savings Bank Account	91.07	
Overdue Fees	154.80	
Special Deposit Receipt	547.32	
Canadian Northern Montreal Land Co., 6% on $20,000 for six months	600.00	
	$1,393.19	
Less		
Interest on Bank Overdraft	$76.76	
Paid to Mrs. E. B. Ibbotson on balance of purchase price of Mansfield Street Property, 6 mos. to 31st October, 1912, at 5½ %	632.50	
Paid to Canadian Northern Montreal Land Co. on $40,000 at 3% from 18th March to 30th April, 1912	144.66	
	853.92	
		539.27
Carried forward		$21,558 72

Expenditure

Transactions and Advance Proofs	$5,052.72
Printing, Stationery, Binding and Diplomas	1,812.05
Books, Magazines and Library Expenses	125.27
Postage, Post Cards and Telegrams	1,664.45
Salaries of Office Staff	4,575.00
Rent of old Building	800.00
Caretakers Wages	620.00
Repairs and House Supplies	94.16
Taxes on new Property	803.80
Water Rates	44.62
Electric Light	122.40
Insurance	168.00
Coal and Wood	103.10
Gas for Cooking	24.45
Expenses Annual Meeting	188.37
Expenses Ordinary Meeting	242.59
Legal Expenses	145 55
Students' Prizes	25 00
Telephone	117.38
Auditors' Fees	50.00
Cabs, Cartage, etc	27.65
Bank Commission	38.13
Sundry Expenses	126.41
Messengers and Express	4.50
Gzowski Medal	9.10
Branch Societies—Toronto	905.00
" Quebec	205.00
" Winnipeg	440.00
" Ottawa	575.50
" Vancouver	530.00
" Kingston	74.00
" Victoria	80.50
Carried forward	$19,794 70

CANADIAN SOCIETY OF CIVIL ENGINEERS

ABSTRACT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1912

Receipts		
Brought forward		$21,558.72
SALES OF TRANSACTIONS AND PERIODICALS		185.04
DIVIDENDS—		
Can. Per. & West. Can. Mtg. Co. Stock	16.20	
Montreal Light, Heat & Power Co. Stock	17.00	
		33.20
INTERNATIONAL CONGRESS OF NAVIGATION—		
Refund of Expenses from Government		122.50
TOTAL RECEIPTS ON REVENUE ACCOUNT		$21,899.46
PROPERTY ACCOUNT—		
Received from Canadian Northern Montreal Land Co., Ltd. on account of sale price of Dorchester Street Property		40,000.00
TOTAL RECEIPTS		$61,899.46
CASH BALANCE FROM 1911		9,757.72
BANK OF MONTREAL OVERDRAFT		3,484.66
		$75,141.84

Expenditure		
Brought forward		$19,794.70
Examiner's Fees	159.50	
Expenses of Committee	71.25	
TOTAL EXPENDITURE ON REVENUE ACCOUNT		$20,025.45
PROPERTY ACCOUNT—		
Paid on account of purchase price of Mansfield Street Property		24,100.00
Expenditure on New Building		25,966.83
TOTAL EXPENDITURE		$70,092.28
CASH ON HAND		49.56
CASH ON SPECIAL DEPOSIT RECEIPT, BANK OF MONTREAL		5,000.00
		$75,141.84

Montreal, January 9th, 1913.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A., *Auditors.*

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AS AT 31st DECEMBER, 1912

Assets

PROPERTY ACCOUNT—		
Balance at 31st December, 1911	$15,493.86	
ADD Purchase Price of Mansfield Street Property	47,100.00	
Expenditure on New Building to date	25,966.83	
	$88,560.69	
Deduct		
Sale Price of Property No. 413 Dorchester Street West to Canadian Northern Montreal Land Company	60,000.00	$28,560.69
FURNITURE—		
Balance at 31st December, 1911	$1,494.13	
Less 10% written off for Depreciation	149.41	1,344.72
BOOKS—Estimated Value		5,320.00
ARREARS OF FEES—Estimated Value		5,000.00
CANADA PERMANENT & WESTERN CANADA MORTGAGE CORPORATION STOCK		180.00
MONTREAL LIGHT, HEAT & POWER CO. STOCK		140.50
GOLD MEDAL		45.00
CANADIAN NORTHERN MONTREAL LAND CO., LTD.		
Balance of Sale Price of Dorchester Street Property		20,000.00
SPECIAL BANK DEPOSIT RECEIPT		5,000.00
CASH ON HAND		49.56
		$65,640.47

Liabilities

PRIZE FUND ACCOUNT			$468.77
MRS. E. B. IBBOTSON—			
Balance of Purchase Price of Mansfield Street Property			23,000.00
BANK OF MONTREAL, OVERDRAFT			3,484.66
SURPLUS—			
Balance at 31st December, 1911		$36,962.44	
ADD			
Receipts on Revenue Account	$21,899.46		
LESS			
Expenditure	20,025.45		
		1,874.01	
		$38,836.45	
LESS			
Written off for depreciation on Furniture Account, 10%		149.41	
			38,687.04
			$65,640.47

Montreal, January 9th, 1913.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.
Auditors.

The Treasurer finds it more difficult every year to say anything new concerning the financial standing of the Society.

For a long time it has always been the same story of increasing membership and receipts, with cost of management keeping at a low figure.

It is to be expected, however, that next year's report will be somewhat different in this respect, for, while we feel confident that the number of new members will at least keep up to its present figure, it is evident that when we get into our new home, which is considerably larger than the present one, we shall have to prepare for an increased staff and for larger expenditure on the maintenance of the premises.

ERNEST MARCEAU,
Treasurer.

Montreal, *16th January, 1913.*

Obituaries

BARCLAY, WILLIAM DUNCAN, M. Can. Soc. C.E., was born September 23rd, 1851, at Campbellton, New Brunswick. Mr. Barclay's education was received in the schools of Campbellton, N.B. In September, 1867, his first occupation in the railroad business was as rodman for the Western Extension of the European North American Ry., St. John to Vanceboro, which is now a part of the Canadian Pacific Railway. In 1868 he was Assistant Engineer of the same road. In 1869 he went with the Maine Central as Assistant Engineer and in the fall of 1870 with the Prince Edward Island Railway as Assistant Engineer, remaining there until November, 1874. His next move was as Engineer in charge of surveys with the Halifax & Cape Breton Railway until March, 1875. He then went with the Spring Hill & Parsboro Railway in charge of location and construction. In 1876 he was Engineer in charge of construction of the Intercolonial Railway between Cedar Hall and Metapedia. In Oct., 1876, he was Principal Assistant Engineer of Halifax & Cape Breton Railway until June, 1879. His next position was as District Engineer of Canadian Pacific Railway in charge of Government surveys from Manitoba boundary west to Fort Ellice until 1880. In 1880 he was Engineer in charge of construction from Winnipeg west to the Manitoba boundary, March, 1881, to May, 1882, Engineer in charge of surveys of the Canadian Pacific Railway Co., Winnipeg to the Saskatchewan River. 1882 to March, 1885, Assistant Chief Engineer Can. Pac. Ry. Co., Western Division. March 1885, to May, 1886 Chief Engineer Alberta Ry. & Coal Co., May, 1886, until January, 1888, Division Engineer of the Great Northern Railway between Devil's Lake and Great Falls in charge of location and construction. March, 1888, till February, 1890, Engineer in charge of construction for Foley Brothers, contractors, of St. Paul, Minn. Feb., 1890, until Nov., 1890, Chief Engineer Great Falls & Canada Railway and of Alberta Railway & Coal Company. November, 1890, till May, 1899, General Manager of Alberta Railway & Coal Company and Great Falls & Canada Ry. From May, 1899, until January, 1907, partner in firm of Foley Brothers, contractors, at St. Paul. He spent the year 1907 in foreign travels. January 1st, 1908, to March, 1909, was General Manager of the Halifax & Southwestern Railway, also of Inverness Railway & Coal Company. From March, 1909, to date, General Manager of the Canadian Northern Quebec Railway, Quebec & Lake St. John Ry., Halifax & South Western

and Inverness Ry. & Coal Co. Mr. Barclay was a member of the Garrison Club of Quebec, and the Halifax Club of Halifax. He died on Dec. 12th, at Riverside, Cal.

BARNARD. JAS. C., A.M. Can. Soc. C.E., was born at Three Rivers, P. Que., on 17th Sept., 1837. After a brilliant course of studies at the seminaries of Nicolet and St. Hyacinthe, he completed his education at the College of the Jesuit Fathers at Fordham, N.Y. He was received as a member of the Surveyers Corp. for the Prov. of Que. in 1867. Thereafter until his death which took place on Oct. 14th, 1911, he was engaged in the practice of Land Surveying and Civil Engineering at Three Rivers.

BELL, ANDREW, M. Can. Soc. C.E., was born in Toronto, Dec., 1835. He was educated at Queen's University, Kingston, and graduated as B.A. in 1853. He subsequently served an appointment for three years in Civil Engineering and during his apprenticeship made surveys for the Toronto and Georgian Bay Ship Canal. In 1856 he made surveys and was placed in charge of the construction of this railway from Carleton Place to Almonte which was completed in 1858. He was afterwards engaged in several railway and hydraulic surveys and in 1870 he was appointed engineer in charge of the enlargement of the Grenville Canal, and later of the construction of the Carillon Canal Dam and Slide which was completed in 1885. From this date until the time of his death he carried on a general practice as civil engineer, land agent and architect in Almonte. He died on October 22nd, 1912.

BELLISLE, CHAS. A., S. Can. Soc. C.E., was born at Deschambeault, Que., on July 11th, 1889. He received a diploma from the Commercial Academy, L'Islet. He began his professional career as chainman on the Transcontinental Ry., and continued his engineering studies with the International Correspondence Schools, Pa. He was admitted as student to the Can. Soc. C.E. on Oct. 8th, 1908. He was drowned in the Manitoba River shortly after joining the Society

BELKNAP, SEWELL FRANKLIN, M. Can. Soc. C.E., was born at Hampton Beach, N.H., September 28th, 1840. He received his early education at the Grammar and High Schools of Northampton, Mass., and commenced his engineering career in 1860 when he came to Canada as rodman on the Stanstead, Shefford & Chambly Ry. In 1862 he became assistant engineer on the Vermont Central Ry. and was in charge of the construction of a section of that road until its completion. In June, 1869, he was appointed assistant engineer on the South Eastern Ry. and continued to occupy that position until 1873, when he was appointed Resident Engineer of the Montreal, Ottawa & Western Ry. From January, 1875, to March, 1876, he was a Division Engineer on the Canada Central Ry. In 1876 he renewed his connection with the South Eastern Ry. and was Resident Engineer for two years, after which, from 1878 to 1883 he was Chief En-

gineer of the Road and continued in general charge of the construction of the line from Montreal to St. John until 1886. He was then appointed Division Engineer at Farnham, a position which he occupied for nine years. In 1895 he was the Resident Engineer at Farnham and remained in that position until 1906, when he retired. Mr. Belknap died in Montreal on October 23rd, 1912.

BOUCHER, CHAS., A. M. Can. Soc. C.E., was born at Woolston, Eng., on June 4th, 1850. He was educated at the Royal Naval College, Greenwich, and served his apprenticeship under Sir Edwin Clark. During his long professional career he was connected with the development of railways in various parts of Canada as engineer, both on location and on construction. Latterly he was attached to the staff of the Algoma Central & Hudson Bay Ry. Co., with headquarters at Sault Ste. Marie, Ont. He died in April, 1912.

BOVEY, DR. H. T., M. Can. Soc. C.E. and Past President of the Society, was born in Devonshire in 1852. He was educated privately and at Queen's College, Cambridge, where he took a high place in the mathematical tripos. His early engineering training was with the Mersey Docks and Harbour Board of Liverpool, and he left the position of assistant engineer to that body to take up the duties of the professorship of civil engineering and applied mechanics in McGill University in 1878.

At that time the engineering instruction given was organized as a part of the work of the Faculty of Arts, and there were no separate laboratories or equipment. Following shortly upon Dr. Bovey's arrival in Montreal the Faculty of Applied Science was organized separately, and he became its first dean, a position which he held for a period of twenty-nine years until his resignation in 1908. From the inception of the Faculty of Applied Science dates the long list of magnificent gifts of Sir William Macdonald to McGill University, and to Dr. Bovey belongs the credit of being the first to secure the interest of Sir William in McGill affairs.

While in Montreal Dr. Bovey's activities in professional work outside that directly associated with McGill University were many. He was one of the founders of the Canadian Society of Civil Engineers, and held office as secretary-treasurer or member of council for many years. He was vice-president in 1896-7 and became president in 1900. He was also a member of the Institution of Civil Engineers in England, and before leaving Liverpool had assisted in founding the Liverpool Society of Civil Engineers. He took an active interest in many of the meetings of the British Association for the Advancement of Science and occupied the presidential chair of the Engineering Section at some of its meetings. He contributed numerous technical and scientific papers to societies with which he was connected, and wrote two well-known textbooks, one on "Hydraulics" and the other on the "Theory of Structures and Strength of Materials"; the latter being a development of an earlier treatise on "Applied Mechanics."

Dr. Bovey received many coveted distinctions in the academic world, chief among them being the Fellowship of the Royal Society of London, to which he was elected in 1902. He was an honorary LL.D. of McGill and Queen's Universities, and D.C.L. of Bishop's College. He was also elected an honorary Fellow of Queen's College, Cambridge, in 1906, a mark of appreciation from his old college of which he was justly proud.

In 1908 Dr. Bovey resigned his position in Montreal and was appointed rector of the Imperial College of Science and Technology in London. Shortly after this appointment his health began to fail, and he was only able to hold office two years, a period insufficient to enable him to develop fully the plans which he had in mind. For the past two years he had lived quietly in London and spent long vacations in Italy and the South of France. He never regained his old vigor, however, and died at Eastbourne, England, on February 2nd, 1912.

CHIPMAN, LAWRENCE H. K., S. Can. Soc. C.E., was born at Montreal on 19th Feb., 1887, and educated at the Montreal High School. He began his engineering work as chainman to the C. P. Ry. in July, 1905, and served in various capacities with that company. He was placed in charge of a residency in April, 1911, on the eastern branch and latterly transferred to the construction department with headquarters on Lake Hamilton, Alta. He died in April, 1912.

CLIFFORD, WILLIAM, M. Can. Soc. C.E., was born in Ireland in 1871. He was educated at the public schools and later at the Christian Brothers Academy, where he took two first class scholarships. He held a professorship at Fermoy College, County Cork. Mr. Clifford came to Canada in 1891, and was employed on the old Parry Sound Ry. Later he was connected with the construction of the Crow's Nest Pass Ry. and with the Algoma Central, and from there he went to the Temiskaming and Northern Ont. Ry. as assistant to the chief engineer. He located the greater portion of this road and then accepted a position as assistant engineer on the N. T. Ry., which he left to take a similar post with the Hudson Bay Ry. The deceased made the first location of the Hudson Bay line from Split Lake to Fort Churchill. His death occurred in Victoria, B.C., on November 21st, 1912.

COBURN, CHAS. N., M. Can. Soc. C.E., was born at Melbourne, P.Q., June 14th, 1857, and educated at St. Francis College, Richmond. He began his engineering career on the Canadian Pacific Ry. as rodman on construction. After remaining in the employ of this railway for many years as assistant engineer, he accepted the position of chief engineer of the Algoma Central & Hudson Bay Ry. Co. A few months before his death, which occurred on March 9th, 1912, he held the position of chief engineer of the Lake Superior Iron & Steel Co.

FARNSWORTH, C. A., S. Can. Soc. C.E., was born at Sawyerville, Que., on Dec. 21st, 1887. He entered McGill University but did not complete the course on account of ill health. His professional work, for the greater part, was connected with land surveying operations.

FOTHERINGHAM, JAMES M., A.M. Can. Soc. C.E., was born st Rothsay, Ont., in 1874. He matriculated from a High School and studied for two years at the School of Practical Science, Toronto. Since 1908, Mr. Fotheringham was district engineer of the Grand Trunk Ry.

FOX, C. BERESFORD, M. Can. Soc. C.E., was born on 14th Feb., 1875. He was educated at Harrow and Cambridge, and joined the firm of Sir Douglas Fox and Partners, afterwards becoming a member of Wragge and Fox, of Toronto. He was successively engaged on the London extension of the Great Central Ry., the construction of the Victoria Falls Bridge over the Zambesi, the Nile irrigation works, the Simplon tunnel and other important enterprises. He had taken up work in Canada when his death occurred on 16th April, 1912.

FRY, HENRY, M. Can. Soc. C.E., was born in Devonshire, England, and went to British Columbia with his parents when about 14 years of age. After serving some time with a Provincial Land Surveyor, he joined, in 1874, the staff of Engineers who were appointed by the Dominion Govt. to make the exploratory surveys for the Canadian Pacific Ry. from the Rocky Mts. to the Pacific Coast, and subsequently was Engineer under the late Mr. G. A. Keefer on construction of the same railway between Yale and Kamloops. Beyond his connection with Dominion Government surveys in British Columbia, Mr. Fry was connected with the Provincial Government in its early exploratory and later surveys until the time of his death, which occurred in March, 1912.

GIBBS, F. N., M. Can. Soc. C.E., died in London Eng., Dec. 28th, 1911, aged 38. He graduated from the Royal Military College, Kingston, Ont., and at the time of his death was a member of the firm of McDonald, Gibbs and Co., engineers, London, Eng. He was engaged for years on hydraulic work in South Carolina and California, and subsequently built the Lorenzo Marques Waterworks in Delegoa Bay, S. Africa, one of the most difficult pieces of hydraulic engineering which has ever been carried out.

HALSTEAD, GEORGE, A.M. Can. Soc. C.E., was born in Lancashire, Eng., on June 13th, 1884. He attended the University of Manchester, and graduated with honors as B. Sc. in 1905. His active engineering work began as assistant to the borough engineer of Nelson, Lancs. For two years he was engaged as demonstrator in the department of civil engineering at the University of Liverpool. In 1910 he was appointed lecturer in civil engineering at the University of Manitoba, which position he held till the time of his death, which occurred in Oct., 1912.

IRVINE, JOHN, A.M. Can. Soc. C.E., was born at Mille Isle, Que., 27th March, 1868. After graduating from the School of Practical Science in Toronto, he assisted on the right of way survey of the Can. Pac. Ry., and was afterwards locating engineer in the construction department. In 1906 he entered the service of the James Bay Ry. as division engineer While in the employ of the C. N. Ry. as locating engineer he met with an accident which caused his death on 9th Aug., 1911.

KEATING, E. H., M. Can. Soc. C.E., was born at Halifax, N.S., 7th Aug., 1844 and died at Toronto 17th June, 1912. He received his education at Dalhousie College, with a view of taking up architecture. He soon engaged in surveys and studied engineering under George Whiteman, C.E. provincial government engineer of Nova Scotia. For three years he was on surveys, location and construction of the Truro & Pictou Ry., and was chief draftsman of the Windsor & Annapolis Ry. At the close of 1867 he engaged in the Intercolonial Ry., where he was assistant engineer on some of the heaviest construction of this road. Mr. Keating was appointed division engineer in charge of exploration on the C. P. Ry. surveys in the Spring of 1872, but resigned at the end of the same year to become city engineer of the Halifax graving dock, up to its time the largest graving dock on the American continent. He remained at Halifax till the end of 1890, and while there he designed waterworks for Truro, Windsor and Dartmouth, N.S., and for Moncton, N.B. For two years, 1891-2, he was city engineer of Duluth, Minn., where he designed extensive improvements in the waterworks. He was then offered and accepted the office of chief engineer of Toronto, Ont. Shortly after taking office he reported on a comprehensive plan for improvement of the waterworks, which was considered too expensive at the time, but which was afterwards carried out. He designed and completed some important work in Toronto Harbour, including the Keating Channel, which latter was named after him. In 1898 he resigned the post of city engineer, Toronto, to become general manager of the Toronto St. Ry. In 1904 he went to Mexico, where for the greater part of two years he was engineer and manager in the construction of the Monterey Ry. Light & Power Company's Street Ry & Power and Lighting plant, and of the Monterey waterworks and sewerage systems. He remained advisory engineer of these properties for some time after his return to Toronto. For the last six years of his life he was active as general consulting engineer and as arbitrator in valuation, for which his sound judgment and absolute sense of justice admirably fitted him. In 1903 Mr. Keating was chairman of the Royal Commission to report on the construction of a graving dock for the city of Montreal. At various times he was expert advisor on the waterworks and sewerage systems of Ottawa, Hamilton, Victoria, B.C. etc. Mr. Keating was a member of the Am. Soc. C.E., and of the Inst. C.E. He served as a member of council of the Can. Soc. C.E. for 3 years, as vice-president for two years, and in 1901 was elected president of the Society.

KEEFER, G. A., M. Can. Soc. C.E., was born in Cornwall, Ont., on the 10th Sept., 1836, and died in Victoria, B.C., on 17th May, 1912. He commenced his engineering career on the survey of the Grand Trunk Ry. from Montreal to Cornwall. Later he was engaged on the engineering staff on the construction of the Victoria Bridge at Montreal, and the G. T. Ry. line between Montreal and Toronto. He was then transferred to the Brockville and Ottawa Ry. He was engaged in military survey work in the States and on returning to Canada was appointed chief engineer of the Belleville and North Hastings Junction Ry. In 1875 he entered the government service, and was employed in the survey of the C. P. R. in the Rocky Mountains, where he remained until the completion of section No. 2, one of the heaviest in the Fraser River Canyon. He was the organiser and consulting engineer of the Vancouver waterworks system, which was carried out by Mr. H. B. Smith as resident construction engineer. In May, 1900, he was appointed resident engineer of the Public Works Department, in British Columbia, which position he held at the time of his death. He was selected in 1891 by a local syndicate to examine and report upon a proposed contract to construct a railway from Vladivostock, Siberia, to the Amoor River, a portion of the Trans. Siberian Ry. Mr. Keefer served on the council of the Society during five years.

KELLER, LOUIS, A.M. Can. Soc. C.E., was born in Paris, France, 24th Feb. 1846, and graduated from the Polytechnic School in 1866 as Sub-Lieutenant in the Navy. He was engaged in hydrographic work for four years afterwards. He then took part in the German war as captain of corps of engineers and brevet lieutenant of the Navy. Between 1871-75 he was engaged in hydrographic work on the west coast of Africa. In 1876-81 he served the French government in construction of public works. In 1882 he joined the Department of Public Works in Canada, and was employed on railway and hydrographic work for many years. He died in 1912.

LEECH, C. S., M. Can. Soc. C.E., was born at Oldham, Eng., 7th June, 1859. In 1876 he was attached to a firm of civil engineers and architects in Manchester, and in 1882 became chief assistant engineer to a large engineering firm in the same place. From 1884 to 1898 he engaged upon various drainage and sea defence works and the construction of roads and light railways at Weston-super-Mare. Coming to Canada in 1898 he joined the engineering staff of the C. P. Ry. at Montreal, where he was principally engaged in designing of standards and buildings including the plans for the Angus and Winnipeg shops. During the last two years of his life he formulated and had charge of an elaborate system of clearance records covering the entire C. P. R., and had just completed the Eastern Lines when his health gave out. He died on May 2nd, 1912.

MACDONELL, JOHN ALEX., M. Can. Soc. C.E., was born Nov. 22nd, 1854, at Dundas, Ont. He was educated at the School of Practical Science,

Toronto. His first professional employment was as superintendent on the Welland Canal. Subsequently, he was on the staff of the C. P. Ry. In 1878 he was engineer on section "B", Port Arthur to Winnipeg. In 1884 he was engineer in charge of the Manitoba Southwestern Ry., and the following year was the contractor for the building of the railway across the Pembina River Valley. From 1886 to 1888 he sat in the Legislative Assembly, and was afterwards appointed to the office of Deputy Minister of Public Works in Manitoba. He filled the position of Chief Engineer for Manitoba from 1890 to 1896. From 1896 to 1900 he represented Selkirk, Man., in the Dominion Parliament. The contract to build part of the Can. N. Ry. between Port Arthur and Winnipeg fell to his lot, and in 1902 he was appointed Swamp Land Commissioner for Manitoba. For two years he was chief of an exploration party on the Peace River survey. From 1906 to the time of his death, Oct. 17th, 1912, he was attached to the Department of the Interior, Railway Lands Branch.

MacPhie, R. H., A.M. Can. Soc. C.E., was born at Antigonish, N.S. on August 4th, 1881. He was educated at the High School and St. Francis Xavier College in his native town.

In October, 1902, he entered the service of the Public Works Department of Canada as clerk at Antigonish. In April, 1907, he was appointed Assistant Engineer and in 1911 was promoted to the rank of first Assistant Engineer. His death occurred after a brief illness, on December 11th, 1911.

McKenzie, John, A. Can. Soc. C.E., was born in Nova Scotia and educated at Dalhousie College, and at King's College, Windsor, N.S.

He arrived in Victoria in 1880 and four years later entered the Dominion Lands Office, removing to New Westminster in 1886. He was made Land's agent there and held that position till 1911, when he retired, retaining the position of consulting agent only. He was a Provincial and Dominion Land Surveyor and for thirteen years examiner on the board of Provincial Land Surveyors for B.C. He died on 14th April, 1912, at New Westminster, in his 65th year.

Massy, G. H., was born at Tullow Lodge, Co. Carlow, Ireland, on June 9th, 1844. He was educated at Queen's University and Trinity College, Dublin, and graduated as Bachelor of Engineering in 1870. He was engaged for a short time in railway work in Ireland and came to Canada in 1871. His first Canadian work was on the location of the Kingston and Pembroke Railway. He was afterwards in charge of surveys for the Canada Central Railway, the Northern Colonization Railway and was engaged under the late Charles Legge in the surveys for the Royal Albert Bridge project at Montreal. In 1876 he entered the service of the Quebec Government and located the Piles branch of the Quebec, Montreal, Ottawa and Occidental Railway (C.P.R.) As assistant Chief Engineer of the road he built the bridge over the Ottawa river above the Chaudiere Falls and completed the extension of the line to Dalhousie Square, Montreal.

During the year 1882 he was in charge of the construction of the Algoma branch of the C. P. Railway and in 1883 undertook a contract on the main line of the C. P. Ry. at Jack Fish Bay in partnership with Mr. Philip McRae. The work was successfully completed in 1885. For the next year he was engaged in private engineering practice in Montreal and in 1886 again entered the service of the C. P. Ry. as Engineer in charge of the Lachine Bridge. On the completion of the work he took charge of the Sault Ste. Marie Bridge. In 1888 he was engaged in constructing work and in 1889 again opened an office as Consulting Engineer in Montreal. During a period of several years thereafter he was concerned in the construction of several important works, the most important of which was perhaps the Interprovincial Bridge at Ottawa which was completed in 1898. In this year he accepted the position of Chief Engineer for the Reid Newfoundland Company, a position which he occupied until his death. He was appointed a Director of the Company in 1908 and gave up active work as Engineer for the Company in 1910. He died in Montreal on January 10th, 1912. Mr. Massy was a charter member of the Society. He contributed several papers to the transactions and served on the Council for one year, 1890.

METCALF, JOHN S., M. Can. Soc. C.E., was born in 1847 at Sherbrooke, Que., and was educated at the Academy, Cookshire, P.Que. In 1870, after some mechanical experience in Canada, he moved to Indianapolis where he was engaged on the construction of an elevator of which, on its completion, he was the Operating Superintendent. In 1881 he became the Superintendent of Construction for a large Grain Company, and in 1877 he moved to Chicago and with two partners engaged in the construction of grain elevators, in which department of engineering he soon became a recognized authority. Between 1887 and 1894 he was the head of the Metcalf-Macdonald Co. On the dissolution of this partnership he was associated with another engineer for several years in the building of elevators in various parts of America, and in 1901 he established the firm which in recent years has become so well known in Canada—The John Metcalf Company, with headquarters in Montreal and Chicago. Elevators of his design are to be found at all important grain terminals throughout this Continent and many of them are huge structures representing millions of dollars in invested capital. One of his latest works is the 2,000,000 bushel elevator for the Harbor Commissioners of Montreal. He died on 4th March, 1912.

MOHUN, EDWARD, M. Can. Soc. C.E., was born at Chigwell, England, Sept. 3rd, 1832. He arrived at Victoria, B.C. in 1863, and for one year was assistant to the Surveyor General. From 1864 to 1871 he was employed as a surveyor in laying out roads and in exploration surveys. In the latter year he was appointed division engineer for the C. P. R. surveys on the Eagle and Yellowhead passes. He drove the first stake and made the first survey for the C. P. R. on the Pacific coast. From 1873 to 1876 he

was engaged in Government Surveys on Vancouver Island and the Lower Fraser River. In 1876 he was appointed as Surveyor to the Dominion and Provincial Joint Indian Commission and was in charge of these Surveys between 1877 and 1884. In connection with the reclamation works on the Fraser River in which he was engaged in 1885 he invented an automatic sluice box which was adopted by the Government and has proved a very effective device. He made a series of tests of the timber of B.C. for which he received a certificate signed "Albert Edward." The sewerage system of Vancouver was designed and built by him, and he was awarded the premium for a sewerage system in Victoria of which he was chief engineer. He was the Provincial Government Railway Inspector for several years and was engaged by the B.C. Government in reporting on the Sanitary condition of the towns of the Province. In 1898 he entered the office of the Public Works engineer, and was gazetted first assistant engineer. Since then he has designed various public works and has acted as consulting engineer to the Provincial board of health. The conclusions he arrived at in his report on bacterial treatment of sewage were later practically confirmed by the Royal Commission on sewage disposal, Eng. He is the author of many engineering papers and tables constantly in use on the Pacific coast. Mr. Mohun was a Gzowski Medallist and for three years he served as a member of Council of the Society. He died on October 28th, 1912.

NEILSON, MATHEW, M. Can. Soc. C.E., was born in Ramsay. He took up the study of civil engineering early in life, and soon began to play an important part in railroad building in Western Canada. For five years he was engaged on C. P. Ry. construction in the Kicking Horse Pass, B.C. and later was Chief Engineer of the Regina Long Lake and Saskatchewan and Edmonton Railway, now part of the C. P. Ry. System. He made a survey for the proposed Hudson Bay Railway and for some time he was divisional engineer of the C. P. Ry. in Maine. He was appointed President of the St. John Railway and Gas and Electric Company and also became the Managing Director of the Mexican Light, Heat and Power Co. At the time of his death he was Vice-President and General Manager of the Alberta Central Railway. His death took place at Montreal on January 21st, 1912.

O'SULLIVAN, HENRY, M. Can. Soc. C.E., was born at Ste. Catherines, Co. Portneuf, P.Q., in 1846 and was educated there and at the Quebec High School, completing his studies at Laval University. Adopting land surveying as his profession, he successively became a Provincial and a Dominion land surveyor, a civil engineer, inspector of surveys and provincial topographer for the government of the Province of Quebec. He retired on a pension from the Quebec Government only a few months before his death, which took place on March 27th, 1912. Mr. O'Sullivan, by the extent and value of his explorations of the Quebec wilderness, did valuable work for his country. To him is largely due the existing knowledge

of the natural resources of a wide area of his native land. Mr. O'Sullivan will be remembered by the regular attendants at the annual dinner of the Society as on many occasions adding life and humour to that function by his ready wit and musical talent. He was a member of the Quebec Geographical Society and a Fellow of the Royal Geographical Society, England.

RENWICK, H. P., A.M. Can. Soc. C.E., was born in Japan, Sept. 4th, 1870. He was educated at the Collegiate Institute, Victoria, B.C. In 1893 he was rodman on the reclamation works in Kootenay, B.C., and afterwards became leveller and assistant engineer on various railway and road surveys. In 1904 he engaged in a private engineering practice with headquarters at Rossland, B.C. He was admitted as Student to the Can. Soc. C.E. in 1896 and transferred to Associate membership in Oct., 1908. He died at Rossland, B.C., in 1912.

SHANLY, JAS., M. Can. Soc. C.E., was born in Waukegan, Ills. Mr, Shanly's early education was obtained at the Racine College, Wisconsin. and at the Galt Collegiate Institute. Leaving school he entered Toronto University and graduated in the Arts course in 1878. His engineering career was commenced in Montreal in the office of his uncle, Mr. Walter Shanly, and he was for a time associated with the building of the Beauharnois Junction Railway, now a part of the New York Central Line. Continuing in this branch of the profession in which he first embarked, Mr. Shanly was most intimately associated with the development of the Railway System of Eastern Canada as Chief Engineer of no inconsiderable part of it, and he was universally recognized as a leading authority in railroad construction. He was for some years associated with Mr. J. M. McCarthy in private practice in Montreal, and during the last four years of his life he was employed as the Consulting Engineer of a number of Companies and maintained an office in Montreal. Mr. Shanly was a member of the Canadian Society of Civil Engineers from its foundation and took a prominent part in its upbuilding. He served on the Council for five years and was a most effective member of the Committee. At the time of his death he was Chairman of the Finance and of the Building Committee. He died suddenly in Montreal on November 28th, 1912.

SMITH, CECIL B., M. Soc. C.E., was born at Winona, near Hamilton, Ont., 1864. He was educated at the Collegiate Institute at Hamilton and at McGill University from which he graduated in 1884 in the course of Civil Engineering with the degree of B.Sc. as the leader of his class and winner of the Governor General's gold medal; subsequently he took the master of engineering degree. Following his graduation he acted as resident and locating engineer on construction of several railways. He was then engaged on railway work for two years in the United States and in 1893 he became assistant professor of Civil Engineering at McGill University. During the five years he held this position he made a special study

on the characteristics of Portland cement and published several papers dealing with this subject. He was also the author of a text book on railway engineering. After filling the office of locating engineer of the C. P. Ry. on the line between Toronto and Sudbury for one year he was appointed assistant city engineer of Toronto, and held that position for 3 years. Between 1901 and 1905 he was the Resident Engineer in charge of the construction of the works of the Canadian Niagara Power Company at Niagara Falls, Ont. At the close of this work he became the Chief Engineer of the first Hydro-Electric Commission of Ontario. During the two years he occupied this position he was also Chairman and Consulting Engineer for the Timiskaming and Northern Ontario Railway Commision. In 1907 he retired from both Commissions and established the engineering firm of Smith, Kerry and Chace. As senior partner of the firm he had the supervision of planning and constructing some of the largest hydro-electric power plants in the Canadian North West and the Western United States. Amongst these were the developments on the Winnipeg River, the Calgary Power Company's Plant on the Bow River, the Mount Hood Railway and Power works near Portland, Oregon and the Power and Irrigation development at Crane Falls, Idaho. He, also, in a large measure, directed the organization and financing of the Companies which carried out these works. Mr. Smith was a member of the Institution of Civil Engineers of Great Britain and of the American Society of Civil Engineers. He served on the Council of the Canadian Society of Civil Engineers during three years and was Vice-President in 1906. He died at his home in Toronto on July 1st, 1912, after a very brief illness.

SUTCLIFFE. JOHN M., M. Can. Soc. C.E., was born at Stainland, Yorkshire, England, on July 29th, 1837. The greater part of his life was spent in the United States in connection with the water works at Poughkeepsie, N.Y. For nine years he was in charge of the Vallicillo Silver Mines Mexico, and since coming to Canada in 1885 he was appointed General Manager of the Londonderry Iron Co., resident at Acadie Mines, N.S. He died on July 23rd, 1910

THORNLEY, JULIAN, M. Can. Soc. C.E., was born at Charlottesville, Va., Dec. 25th, 1868. He was educated at the University of Virginia, from which he graduated in 1889 with the degree of B.Sc. and C.E. He began his professional career as rodman on the Charleston, Cincinnati & Chicago Railroad. From 1890 to 1892 he was assistant to the consulting engineer of this road and in charge of surveying parties. From 1892 to 1900 he was assistant engineer with the New York Aqueduct Commission in charge of records and plans for the New Croton dam. From 1900 to 1903 he served as assistant engineer with the New York Rapid Transit Commission. In 1903 he became the senior engineer for the Electric Development Co. of Ontario at Niagara Falls, and in 1906 was appointed hydraulic construction engineer to the same Company. His death took place in New York on Dec. 21st, 1912.

TYTLER, F. J. L., M. Can. Soc. C.E., was born at Lucknow, India, 1st Feb. 1849. He served his apprenticeship at Gateshead-on-Tyne, England, and in 1870 he became assistant engineer on construction to the Oude & Rohilkund Ry., Lucknow. In 1871 he entered the Department of Public Works, India, and was chiefly employed as civil engineer on irrigation. In 1881 he retired from Government service to carry on a private practice. In 1891 he was engaged as Engineer to the municipality of Chilliwack and was afterwards employed by the Government of B.C. as Consulting Engineer, and reported on various flooded areas and was in charge of several of the Fraser River dykes. He designed and erected the dam over the rivers Hope and Camp. In 1897 he became Inspector of Dykes to the Government of B.C. and continued to practice as consulting engineer in Vancouver. His death occurred in April, 1912.

REPORTS OF COMMITTEES, JANUARY, 1913.

Report of the Committee on Establishment of Testing Laboratories.

The President and Members,
Canadian Society of Civil Engineers.

Gentlemen,—

I beg to submit the following report of the Committee on Establishment of Testing Laboratories on behalf of the members of our Committee, Professor J. Galbraith, Past President, and Messrs. H. M. Mackay, Peter Gillespie, J. A. Jamieson, A. St. Laurent, Phelps Johnson, Geo. E. Perley and myself.

We regret that very little progress has been made in the last year owing largely to the changes in the administration of the Public Works Department during the year, and that it was necessary to begin all over again with each new Minister.

The Hon. F. D. Monk, who succeeded the Hon. W. Pugsley, was written to and interviewed, and after his retirement the Hon. Robert Rogers, the present Minister, was written to. Owing to the pressure this Session of Government business it has been extremely difficult, though several attempts have been made, to have an interview with the Minister. We have only very lately been able to see him. The present Minister seems favorably disposed and asked that we should write him fully and he will then see what can be done.

We are trying to induce the Government to put enough in the Estimates for this year to make a start and should this be done there is no doubt that the yearly grant and the capacity and equipment of the Laboratory will be increased.

Respectfully submitted,

C. H. KEEFER,
Chairman.

Ottawa, Ont.
January 8th, 1913.

Report of the Committee on the Usefulness of the Society and Educational Requirements.

Shortly after the last Annual Meeting, the Council decided to carry out the recommedation made by this Committee, with regard to the providing of the necessary machinery to carry on examinations of applicants who have had no training in an engineering school.

The Committee held several meetings and finally made suggestions, the result of which was the appointment by the Council of the present Board of Examiners.

The Board entered upon its duties in May last, and has been doing very good work since, as its report will show.

The system of examinations thus inaugurated, it is already apparent, has a tendency to raise the standing of the Society in the eyes of the public and to increase its membership.

COMMITTEE—

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

ERNEST MARCEAU,
Chairman.

Montreal, 7th January, 1913.

REPORT OF THE CANADIAN COMMITTEE OF THE INTERNATIONAL ELECTROTECHNICAL COMMISSION.

The above Committee begs to report that during the year 1912 six publications have been issued by the Commission, the most important of which are those relating to Standard Symbols and the Rating of Electrical Machinery. The Sub-Committees having in hand these two questions and that of prime movers will meet at Zurich, Switzerland, in January next, when final recommendations will be submitted by them for adoption by the Commission.

The next meeting of the complete Commission is to be held in Berlin, Germany, in September, 1913, at which time the various propositions now under consideration will be finally adopted. An International Congress, a meeting that will be of the greatest interest and importance, is planned for 1915, in conjunction with the Panama-Pacific Exposition to be held that year in San Francisco, Cal.

The membership and offices of the Canadian Committee remain as last year, viz.:—

COMMITTEE—

L. A. Herdt, Chairman.
O. Higman, Vice-Chairman.
H. T. Barnes.
L. W. Gill.
T. R. Roseburg.
W. A. Duff.
J. Kynoch.
J. Murphy.
A. B. Lambe, Secretary.

L. A. HERDT,
Chairman.

December 31st, 1912.

Report of Committee on Specification for Steel Bridges.

Your Committee on Specification for Steel Railway Bridges begs to submit its final report on the first section of the work entrusted to them, namely, Specification for Steel Railway Bridges, Fixed Spans.

Your Committee presented its first preliminary report to the Society at their general meeting last year, when it was decided to send copies of this report to all the members, and asked that meetings be called at the various branches at which this report should be discussed, copies of such discussion being forwarded to the Secretary. Discussions on this report were received from the following members of the Society:

C. R. Young.
J. W. Harkom.
J. G. Legrand.
W. A. Duff.
P. L. Pratley.
O. K. Peck.
A. Smith.
F. P. Shearwood.
E. H. Darling.
W. Chase Thompson.
C. N. Monsarrat.
G. H. Duggan.
E. Brydone-Jack.
H. Steenbuch.
Jos. Mayer.

This entire discussion was tabulated and forwarded to each of the members of the Committee, for comment thereon.

It might be pointed out that practically the only points upon which any general discussion arose were those of "impact" and "column formulae." With regard to the former, some members of the Society were inclined to adopt the tentative formula suggested by Prof. Turneaure, As the opinion of the different members on this point varied to a very large extent, and as the formula of Prof. Turneaure was not put forward by him for adoption but simply as an interim report of investigations, your Committee felt that they would not be justified in making such a radical change, and have therefore adopted a formula that has been generally accepted as good practice.

In regard to the column formulae, many suggestions were received as to the proper formula to be used, but the consensus of opinion appeared to be in favor of the straight line formula, which has been adopted in so many of the existing specifications, and which, under ordinary conditions, agrees very closely with the results as established by actual tests.

As the members of your Committee are so widely scattered, it has been impossible for them all to get together and deal with the matter under discussion, the result being that the greater part of the work has fallen upon the shoulders of the local members, who have had to decide on the various points to a more or less extent.

It is probable that the specifications as prepared will not meet the views of all members of the Committee or of the Society, in fact in dealing with such a subject it could hardly be expected that a full agreement on so many important questions could be reached. It has been the endeavor

of your Committee, however, to consider the different points brought up as broad-mindedly as possible, both from the engineer's standpoint as well as that of the contractor, and to arrive at a result that will combine the best interpretation of bridge engineering practice with the most up-to-date and generally approved shop practice.

It is the opinion of the majority of your Committee that it would be desirable to issue separate specifications for the distinctly different types of bridges. With this idea in view, they have included in the first section only such information as applies to Fixed Span Railway Bridges.

Your Committee is now going ahead with the preparation of specifications on the other sections, namely, Highway Bridges and Movable Bridges (including swing and lift bridges and turntables).

COMMITTEE:—

C. N. Monsarrat, Chairman.	N. M. McLeod.
F. P. Shearwood.	H. G. Kelley.
J. G. LeGrand.	W. A. Bowden.
R. F. Uniacke.	P. B. Motley.
G. H. Duggan.	F. C. McMath.

C. N. MONSARRAT,
Chairman.

January 10th, 1913.

REPORT OF THE COMMITTEE ON CONSERVATION.

The field of conservation, so far as it affects the engineering profession, is so vast that it was deemed inexpedient to deal with more than one phase of it. At the last annual meeting a communication from Mr. Sauder was addressed to the Society and, later, referred to the Committee on Conservation. Mr. Sauder wrote:

"Whereas the water supplies, water powers, navigation of our "rivers, irrigation of our semi-arid lands, drainage of our over-flow "and swamp lands and the sanitary conditions of our streams and "their water sheds generally are a great asset.

"Whereas an accurate knowledge of a flow of water in nearly "all important streams is essential for the solution of many problems "in connection with navigation, water power, irrigation, domestic "and industrial water supplies, mining, bridge building, river channel "protection, flood prevention and storage for conservation of flood "waters.

"Whereas it is the opinion of the Society that the matter of the "topographical and hydrographic surveys to determine the location "and quantity of water supply and the proper methods of conserving "it should be undertaken by the Federal Government.

"Therefore be it resolved: That this Society, while recognizing "the work already done, urges strongly upon the Dominion Govern-"ment the importance of making the necessary appropriations and

"providing the necessary staff to undertake in an intelligent and sys-
"tematic manner, the gauging of all streams of water supply and the
"location and survey of all sites suitable for reservoirs for the storage
"of water."

This letter was referred to the members of the Committee and the concluding statements of the report embody the substance of the replies received from them. In view, however, of the importance of the subject it was deemed advisable to take this subject—Water Supply and its Conservation in Canada—as the special subject for this year's report.

When planning to develop a water power or a navigation channel, the first consideration is: What is the minimum flow? The speed of a squadron is the speed of the slowest vessel and, speaking generally, the minimum flow is a determining factor in a water-power or a navigation project. The minimum flow may often be increased by storage in reservoirs but the initial step is to determine its amount and the maximum period that it may be expected to continue.

In arriving at anything approaching a reliable estimate of the minimum flow of a stream, a series of continuous gaugings extending over a considerable period is absolutely necessary. George W. Rafter, in Water Supply Paper No. 80, published by the U.S. Geological Survey, says:

"Further, it can be stated that, for records from twenty years
"to thirty-five years in length, the error may be expected to vary
"from 3.25 per cent. down to 2 per cent., and that, for the shorter
"periods of five, ten and fifteen years, the probable extreme devi-
"ation from the mean would be 15 per cent., 8.25 per cent. and
"4.75 per cent. respectively."

Rafter says, further, that with less complete records,

"Mr. Henry reached the conclusion that at least 35 to 40 years'
"observations are required to obtain a result that will not depart
"more than ± 5 per cent. from the true normal. The average vari-
"ation of a 35-year period was found to be ± 5 per cent. and for a
"40-year period ± 3 per cent."

From the foregoing, it is evident that unless the engineer is in a position to allow a margin on the safe side, he should have continuous gaugings extending over at least ten years. As an example of an erroneous estimate based on insufficient data, the Rainy River at Fort Frances may be cited. Three engineers, reporting separately, estimated the power at 30,800, 33,000 and 34,741 horse power respectively. In the summer of 1911, they were able to generate less than 11,000, and, to do this, it was necessary to keep the stop-logs in all day Sunday, thus stopping navigation. Had gaugings extending over, say ten years, been available, no such over-estimates would have been made and, had they included the very dry season of 1895, they would, probably, have shown as small a flow as in 1911.

Canada is particularly favoured as regards reservoir possibilities. The whole of the northern portion of the Dominion is occupied by a series of granitic rocks, which have a U-shaped form and surround Hudson Bay. This area has been called the Archaean nucleus and, considered in the large, it forms a great plateau. To quote the words of the late Dr. G. M. Dawson,

> "It constitutes, moreover, a gathering ground for many large "and almost innumerable small rivers and streams, which, in the "sources of power they offer in their descent to the lower levels, are "likely to prove, in the near future, of greater and more permanent "value to the industries of the country than a great coal-field "

The foregoing was written sixteen years ago, and, with the tremendous strides in electrical engineering, is even truer to-day than then.

The most remarkable features of this Laurentian area are the innumerable lakes which serve as natural reservoirs to regulate the run-off and which can, in many cases, have their storage capacity increased by damming.

In considering the work of stream-gauging in Canada, the provinces have been dealt with in geographical order from East to West.

In the Maritime Provinces, the streams are small and very little gauging has been done except on the St. John River and some of its tributaries. The work on the St. John has been undertaken as a result of differences between Canada and the United States respecting the provisions of the Ashburton Treaty affecting this stream. The St. John above the Allagash and at Fort Kent, the Allagash, St. Francis, Fish, Madawaska and Aroostoock have been gauged. Measurements have also been taken on the St. Croix River which forms the Southern boundary between New Brunswick and Maine. So far as ascertainable, nothing has been done in the way of investigating sites for reservoirs except the reconnaissance surveys made by the Commission of Conservation in 1911.

In Quebec, the more important power companies keep records of the streams on which they are operating. Between lake St. Francis and Sorel, the Department of Public Works has at present nine gauges. Two of these gauges are of the self-recording type and four others of the same type will be in operation next summer.

The Department of Public Works has sixteen gauges on the Ottawa River, and also maintains gauges on its important tributaries. The Engineers of the Georgian Bay Ship Canal, appreciating the importance of stream measurements, made in their report the following recommendation:

> "That it is of great importance to continue every year the flow "measurement of the Ottawa, Mattawa and French Rivers, at low, "ordinary and high water stage, in order to have continuous records "of same, which will prove invaluable in the further development "of the canal problem, in case of construction, and a better knowledge "of the water-power possibilities."

On the Richelieu River, the depths on the lock sills of the Chambly canal, at St. Johns, have been recorded daily since 1869 and the level of lake Champlain has been noted daily at Fort Montgomery, N.Y. since 1871. At Montreal, the depths of water on the lower lock sill of the Lachine canal have been measured at noon each day since 1851.

The Province of Quebec has appointed a Commission with the Hon. S. N. Parent, as Chairman. They have recommended the construction of a large dam on the upper waters of the St. Maurice to regulate the flow and have three parties in the field making topographical and hydrographic surveys of various rivers in the Province.

On the St. Lawrence above Montreal the depths on the lock sills have been recorded since 1860. These, therefore, give an excellent series of gauge readings for the river at lake St. Louis, lake St. Francis, Long Sault rapids, Farrans Point, Morrisburg and Cardinal. Similarly, the canal records at Ste. Anne, Carillon and Grenville determine the regimen of the Ottawa since 1870, while the lock depths at Ottawa extend back to 1844. For lakes Superior, Huron and Erie, the records cover the period since 1860, while the Toronto gauge records of lake Ontario extend back to 1854.

In the western portion of Ontario the Departments of the Interior and Public Works have established one gauge on Rainy Lake and five on Rainy River. Next summer five of them will be replaced by self-reading gauges. In connection with the investigation of the water-levels of the Lake of the Woods, the International Joint Commission will establish others on the upper waters of the Rainy River.

So far as work by provincial governments is concerned, Ontario is much the most advanced. Its Hydro-Electric Power Commission has established gauging stations on a great many of the streams of the province and is carrying on the work of stream-gauging in a thorough and systematic manner; possibly the only improvement in this connection would be the establishment of additional stations until all the streams of importance are included in the work.

The powers conferred upon the Commission in this connection may be described as follows:

"It is duly authorized to investigate and report to the Lieutenant-Governor-in-Council upon any and all hydraulic, hydro-electric and other power undertakings, whether developed or undeveloped, throughout the Province."

In connection with the waterpowers of the Winnipeg River, the Water Powers Branch of the Department of the Interior has investigated the water resources of the Lake of the Woods drainage basin. In conjunction with the Department of Public Works, gauging stations have been established on Rainy River and certain important streams falling into Rainy Lake and a study has been made of the outflow from the Lake of the Woods.

While in the Maritime Provinces, Quebec, Ontario and British Columbia, except the Railway Belt and Peace River Block, the water powers are disposed of and are under provincial jurisdiction, in the Prairie Provinces, Manitoba, Saskatchewan and Alberta, they are under the control of the Dominion Government. This right was reserved when the provinces were created with a view of better conserving their waters as a whole and for this purpose a large forest area on the eastern slope of the Rocky Mountains has, recently, been segregated by the Dominion.

In Manitoba the Water Powers Branch of the Department of the Interior has established stations on the more important rivers where information is required in connection with waterpowers, drainage, navigation, etc. The work is being gradually extended over the whole province to meet the economic conditions.

The Dominion Government has, for some time past, made investigations of the flow of streams in the latter provinces and, although these investigations were more particularly for irrigation purposes, they also have an indirect bearing on waterpowers. The following is an extract from one of the reports on this work:

"The records of stream flow published by the Irrigation Surveys give a fair approximation of the discharge of the principal streams in Southern Alberta and Saskatchewan at the different stages, but do not give the duration of the periods of high and flood discharge. As the water supply in some of the larger streams is apparently almost all recorded, the necessity of carrying on a systematic observance of daily discharge is evident.

"The chief features of the hydrographic work are the collection of data relating to the flow of the surface waters and the conditions affecting this flow. Information is also collected concerning the river profiles, duration and magnitude of floods, waterpower, etc., which may be of use in hydrographic studies."

"In organizing the Hydrographic Surveys it was realized that with the funds available, it would be impossible to make complete investigations of the whole of the water supply in the irrigation tract, but an effort was made to include all the more important streams. Gauging stations had already been established, by the Irrigation Surveys, on a number of the more important streams, and it was important that the observations at these should be continued without interruption. There were, however, many streams of considerable importance upon which there were no gauging stations. It therefore became the policy of the survey to continue the investigations at the stations already established and to establish other stations as soon as possible."

Unfortunately, as the work is being pursued in connection with irrigation, it does not include any figures for the winter season, which additional data would be of great value from a waterpower standpoint; this is recognized in the following quotation also from the report above cited:

"On streams where power is likely to be developed, special attention should be given to the low water flow, which in most cases occurs during the winter. For this reason it is very important that stream measurements should be continued during the winter on a number of the more important streams."

In British Columbia, the Water Powers Branch has a permanent organization known as the Railway Belt Survey. Gauging stations have been established on the important water-power rivers in the Railway Belt and special attention has been given to the streams in the so-called "Dry Belt."

During 1911 and 1912, the Commission of Conservation made reconnaissance surveys of water-powers in southern and central British Columbia and this work will be continued. In 1912, the Department of Lands of British Columbia, recognising the value of this work, appropriated nearly $2,500.00 in addition to the amount expended by the Commission of Conservation and will, this year, make a grant of $5,000.00. This work, however, is only in the nature of a reconnaissance and, wherever the development of the country indicates that the water will be economically usable, it should be followed up by such measurements as the Water Powers Branch of the Department of the Interior is now carrying on.

The great importance of systematic stream gauging in Canada cannot be over estimated. On the information furnished by the Government will depend to a great extent the development of water-power. Very often, before designing a development, the hydraulic engineer has to spend a year or more in making observations which in many cases are practically useless, because they do not cover a sufficiently long period, and the result is that the possible development is either much over-estimated or, in other cases, much under-estimated.

Although most of the waters of Canada are under provincial control, this matter of stream gauging is not only important to the different provinces but it is of national importance, and the Federal authorities should undertake the gauging of Interprovincial and International rivers to collect this all-important data in a systematic and uniform manner.

The Provincial Governments could make a beginning by devoting their attention altogether to the establishment of stations where the water levels only would be read, leaving, if necessary, for future years the systematic observations required to convert these water heights to discharges. It was in this manner that it has been possible to calculate the different discharges of the Ottawa River since 1844; water-levels only had been kept since that date by the lockmasters of the canal at Ottawa and it was only comparatively recently that observations were taken to convert these water-levels into actual discharges.

For the present, of course, it would be out of the question to have these stations on all of our streams, but a start might be made on the more accessible ones or those on which storage and conservation will become a necessity or a natural outcome at some future date. At pre-

sent, there are very few streams in Canada on which artificial storage or conservation is being practised, because it has not yet become commercially economical or necessary to do so. When the power possibilities of a stream under natural flow have been exhausted at one site, other sites, nearby, on the same or other streams have been found and developed, this requiring less outlay per h.p. than would have been required to conserve the flow of the stream. But this cannot go on forever, and a time will come when the last site within an economical radius will have been secured and the conservation of the stream will have to be resorted to in order to satisfy the increasing demand for power. When this time comes, in order to develop a conservation scheme on any stream intelligently, it will be necessary to possess a complete history of the flow of the stream under consideration for a period of at least from ten to fifteen years previous, and, unless a beginning is made now on the history of flow of some of these streams, when the time comes to conserve them, the data at hand will be found very meagre and the conservation scheme will have to be designed in a more or less haphazard manner.

With federal co-operation, the system now practised in Ontario could probably be continued and extended to comprise other streams and establish new stations more rapidly.

In Quebec and the Maritime provinces much data on this subject could no doubt, first of all, be collected from private parties or large hydraulic plants where records of river heights have been kept, and a system similar to that of Ontario or a modification to suit local conditions could be started at once and the returns from the different stations throughout Canada sent to their provincial authorities as well as to Ottawa, where they could be tabulated in a uniform manner and printed for easy access to the public.

Other countries with less water-power possibilities than Canada have devoted a great deal of attantion to systematic observation of stream flow, namely: Italy, Switzerland, Bavaria, France and other European countries. In the United States the Geological Survey has for years devoted a great deal of attention to the subject of stream measurement and has developed an excellent system, both of carrying out the work in the field and of reporting and tabulating the data obtained.

In Canada one of the greatest difficulties to be overcome in connection with this work is the taking of observations during the winter season, as practically all our streams are then frozen over. These difficulties, however, can be overcome, and they are always more than balanced by the importance of obtaining complete and reliable data during the very time when the rivers are in this condition.

In a report on "Stream Flow during the Frozen Season," Messrs. H. K. Barrows and R. E. Horton of the U.S. Geological Survey say in part—"There is not even an approximate relation between the snow-fall and the stream flow, so that the failure to obtain winter records of flow at a gauging station means a considerable percentage of uncertainty as

to the total run-off as well as its distribution. In the Northern states droughts are apt to occur in the late summer or fall and during the winter. At times this condition of drought may be early or quite continuous between these two periods, with its culmination in January or February. If there is no melting of snow during the winter, the inflow to streams that freeze is chiefly derived from springs, ground water, and lake storage, and in a long, cold winter, especially if it succeeds a period of low water, the minimum flow for the year may be reached and continue for some time. Estimates of flow, therefore, to be of conclusive value on streams utilized for water-power, must embrace these winter periods of low water."

It is needless to add that the winter conditions which occur in Northern United States rivers are found even in a more marked degree in Canadian rivers, and it follows that the statement just quoted applies with a proportionately greater force to Canada.

Summing up, the Committee on Conservation is of the opinion that, while the work recommended by Mr. Sauder, viz., topographical and hydrographical surveys to determine the situation and quantity of water supply, should be undertaken by the Dominion Government, and is of great importance, it is probable that the Government is, at the present time, carrying on more extensive and detailed investigations of this nature than is generally appreciated. That, while a certain amount of concentration to avoid duplication and overlapping of work is necessary, the scale upon which the work has been initiated indicates that the needs of the country in this respect will be met.

That the work already done is of great value but that much of it is not, in its present form, available to the engineers, and

That steps should be taken to secure such publication and distribution of this information as will bring it within the reach of each and every engineer in Canada.

COMMITTEE—

JAMES WHITE, Chairman
H. F. LAURENCE
R. MCCOLL
R. O. SWEEZEY
W. H. BREITHAUPT
G. A. BAYNE
A. J. MACPHERSON
J. S. DENNIS
J. B. HEGAN
C. E. W. DODWELL
A. E. DOUCET
R. S. LEA
R. W. LEONARD
E. E. BRYDONE-JACK
W. R. W. PARSONS
JOHN CHALMERS
T. H. TRACEY

JAMES WHITE,
Chairman.

January 10th, 1913.

Discussion on the Report of Council.

On the request of some members, the Secretary read a list of members deceased during the year.

The names of gentlemen who had resigned were also read, and it was pointed out that nearly all of these were students who for various reasons did not wish to proceed to a higher grade.

The President — The President explained that amongst those removed from the rolls for non-payment of dues there were none who had ceased to be active professionally, provision having been made for such under By-Law 26.

Mr. McNab — Mr. W. McNab called attention to the letters addressed to the Premier of Canada, the Premier of British Columbia and the Ministers of Public Works and of Railways and Canals in reference to the employment of Alien Engineers in British Columbia, and desired information as to the character of the answers received.

The President — The President replied that the acknowledgments were merely formal. He also stated that the Council had been very strongly urged to prosecute this matter vigorously, and that it was the desire of the Council to do so in the manner indicated by the letters in question.

Mr. McNab — Mr. McNab expressed his doubt as to the wisdom of any such movement and was of opinion that all Government engineering appointments were given most careful consideration.

Mr. Robinson — Mr. L. G. Robinson did not consider this the proper time for a discussion of so important a subject. He desired that it should be brought up under such conditions as would give opportunities for a full expression of the views of engineers representing all parts of Canada, when he would endeavour to present the views held by his brethren in British Columbia. He remarked that candidates for Government positions in the United States were invariably asked the question, "Are you an American citizen?" and in his opinion it was not a subject which should be neglected or shelved.

Mr. Thompson — Mr. T. Kennard Thompson considered the movement a great mistake and was of opinion that no organization could discriminate between its members. It might be all right to urge that only members of the Canadian Society of Civil Engineers should be employed.

Mr. Breithaupt — Mr. W. H. Breithaupt concurred in the view expressed by Mr. Thompson. He urged that qualification alone should count, and that this Society should above all other considerations take a stand for progress in engineering.

The discussion of this matter was, on the suggestion of the President, deferred to a later time.

Mr. Jamieson — In continuation of the discussion of the Report of Council, Mr. J. A. Jamieson expressed the opinion that the members were not getting the information to which they were entitled and complained that the Council did not take the membership sufficiently into its confidence. He also expressed the view that the Society, as represented by the Council, should take a more active part in matters of public interest such as the present street car conditions in Montreal.

Mr. T. K. Thompson complimented the Society on its complete and wonderful organization. He expressed the wish that the Society would go one step further and make the country put engineers on its big commissions. On motion by Mr. Robinson the report of Council was adopted by unanimous vote. Mr. Thompson

In connection with the discussion of the Report of the Library and House Committee, the arrangements under which special researches could be conducted on behalf of members were explained. Detailed statements regarding these had been published in the bulletin of the past two years and another in the same connection had been posted in the Reading Room.

On the request of several members representing Branches of the Society the President undertook to have inquiries made as to the practicability of securing the publications of Engineering Societies in the United States and elsewhere for the reading rooms of the Branches.

On motion by Mr. D. W. McLachlin, duly seconded, it was resolved that the library and reading room of the Society should be open for six hours on Sundays. Mr. McLachlin

On motion by Mr. H. D. Lumsden, seconded by Mr. S. Blumenthal, the Report of the Library and House Committee was adopted. Mr. Lumsden Mr. Blumenthal

The President asked that the financial statement be now considered. After some explanation of various items had been given, it was found that the summation of the columns in the Auditors' report as printed was in error, and on motion by Mr. Robinson, seconded by Mr. Harkom, the report was referred back to the Auditors to be presented to the Meeting at a later time. The President

Mr. H. H. Vaughan, referring to criticism of the Council at an earlier stage of the meeting, remarked that he would be much interested in knowing what work, in the opinion of the critics, the Council should do. He asked for some reasonable suggestions instead of a general attack. The view of one speaker that the Society should be more prominent in local civic affairs did not to his mind represent the proper function of an Engineering Society. The only line of activity not undertaken by the Council which appealed to him as likely to be of benefit would be the publication of a journal somewhat similar to the journal of the American Society of Mechanical Engineers and the American Society of Civil Engineers, but this was a matter of great expense, and considering the difficulty experienced in getting papers and discussions there would not be much to put into a journal. In his opinion the most serious difficulty was to get people to read good papers before the Society and until this was done and good meetings were held the Council could effect very little. Mr. Vaughan

Mr. J. A. Jamieson expressed the opinion that the Council was elected to look after all Society affairs and that it was not the duty of the membership to assist. He had personally hesitated to offer his services lest he should encroach on the territory of those elected to do the work. Mr. Jamieson

Mr. D. W. McLachlan stated that in his opinion the members generally were perfectly satisfied with the Council. It was, however, difficult to Mr. McLachlan

induce some members to attend the Annual Meetings on account of the attitude of some who did attend.

Mr. Daw

Mr. Hilder Daw expressed his opinion from past experience that the Council was ever ready to give full attention to any suggestions made to it.

Mr. Robinson

Mr. Robinson remarked that he did not know any other body so well represented as were the members of this Society. Any tendency to lethargy must necessarily be a direct reflection of the lethargy of the membership at large.

The attention of the meeting was then called to the reports of the Branches.

REPORT OF THE VICTORIA BRANCH FOR THE YEAR 1912

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen:—

The above Branch was organized on Feby. 19th, 1912, with a membership of 32 as follows:—

Hon. Members	1
Members	11
Associate Members	17
Juniors	0
Students	3
Associates	0

Three deaths occurred during the year, viz.:—

G. A. Keefer, M	May 17th
E. Mohun, M	Oct. 23rd
W. Clifford, A.M.	Nov. 21st

The total membership on Dec. 31st, 1912, was 62 distributed as follows:—

Hon. Members	1
Members	13
Associate Members	23
Juniors	3
Students	3
Associates	19

Two papers were read during the year:—

"The Effect of Light on Concrete," by W. J. Dart, A.M.

"The Protection of Foreshore on Dallas Rd., Victoria, B.C.," by G. M. Duncan, J.

The annual meeting was held on December 12th, when the following officers were elected.

Chairman—F. C. Gamble (re-elected).
Vice-Chairman—Lewis W. Toms.
Treasurer—A. E. Foreman (re-elected).
Secretary—R. W. Macintyre (re-elected).

Executive:—F. C. Gamble, J. H. Gray, Lewis W. Toms, E. H. Harrison, A. E. Foreman and R. W. Macintyre.

Auditors:—R. A. Bainbridge and H. M. Bigwood.

By-laws for the Branch were adopted on Sept. 12th, and the following scale of fees approved, to cover expense of Club rooms, rent, papers and magazines, stationery, postage etc.:—

Corporate members—$3.00 per quarter.
Juniors—$2.25 per quarter.
Students—$1.00 per quarter.
Associates from $1.00 to $3.00 per quarter.

It was decided at the first meeting of the Branch, that the admission of Associates should be strictly confined to members of the engineering profession, the qualifications of each applicant to be reported on by a Committee on Applications and Credentials, and election to be secured by closed ballot at any regular meeting of the Branch, 90% of votes cast being necessary to elect.

The effect of this By-law has been to make the Victoria Branch thoroughly representative of the civil engineering profession, our membership consisting of qualified men in active practice as civil engineers.

Respectfully submitted.

R. W. MacIntyre, Secretary.

F. C. Gamble, Chairman.

On motion this report was adopted.

Report of the Vancouver Branch for the Year 1912.

The Vancouver Branch of the Canadian Society of Civil Engineers begs leave to submit the following report for the year 1912:—

Since the last Annual Meeting of the Branch on 5th February, 1912, six meetings have been held for the transaction of business and the election of officers.

The Branch has now a membership of 143, viz.:—35 Members, 73 Associate Members, 35 Students.

An illustrated lecture on the "Evolution of Bridge Construction," was read by Mr. G. R. G. Conway, a paper on a "Rural Water Supply System," by Mr. J. C. Kennedy and a discussion was opened by Mr. F. P. Wilson on "Harbour Possibilities and Improvements in Greater Vancouver."

Considerable discussion took place at all the meetings relative to the employment of Alien Engineers on Government and Public Works, and action was taken by deputation and letters to bring this question to the attention of the Government.

The Society failed to secure suitable quarters owing to lack of funds, and the Executive Committee still has the matter under advisement.

Through the courtesy of the Dominion Government a visit was made to the Frühling Suction Dredge whilst at work in the Fraser River. Two visits were made through the courtesy of the British Columbia Electric Railway, one to the Lake Buntzen Power House of that company, and the other to the Hydraulic Fill Dam at Coquitlam Lake.

A First Annual Convention of the Canadian Society of Civil Engineers resident in British Columbia was held at Victoria, on 14th December, 1912, followed in the evening by a banquet at the Balmoral Cafe.

The officers for the year 1912 were as follows:—

Chairman—C. E. Cartwright.

Executive Committee—L. G. Robinson, J. C. Kennedy, H. P. Archibald.

Secretary-Treasurer—W. Alan Kennedy.

At the Annual Meeting of the Branch held 20th January, 1913, the following officers were elected.

Chairman—G. R. G. Conway.

Vice-Chairman—L. G. Robinson.

Executive Committee—C. E. Cartwright, W. A. Clement.

Secretary-Treasurer—F. P. Wilson.

Respectfully submitted.

F. PARDOE WILSON, Secy.-Treas.

On motion this report was adopted.

REPORT OF THE MANITOBA BRANCH FOR THE YEAR 1912

The Manitoba Branch of the Canadian Society of Civil Engineers beg leave to submit the following annual report for the year 1912.

The Officers for the year 1911 were as follows:

Chairman—J. A. Hesketh.

Executive Committee—W. A. Duff, E. P. Fetherstonhaugh, W. L. MacKenzie, J. G. Legrand.

Secretary-Treasurer—E. Brydone-Jack.

MEETINGS

The following Papers were discussed at the regular meetings of the Branch:

November 9th, 1911, "Hudsons Bay Railway Surveys," by Mr. John Armstrong, Chief Engineer, Hudsons Bay Railway.

January 11th, 1912, "G. T. P. Railway Bridges," by Mr. J. G. Legrand, Bridge Engineer, G. T. P. Rly.

February 8th, 1912, "Railway Reconnaissance and Location," by Mr. F. A. Wilkin.

April 4th, 1912, "Paper on Piling, by Mr. R. J. Gibbs.

Special Meetings were also held on February 15th, February 22nd and February 26th, to discuss the report of the Committee of the Main Society on "Roadbed and Ballasting and Steel Bridge Specifications."

The average attendance at these meetings was about twenty-five.

The Annual Meeting of the Branch was held on December 5th, 1912, at which the following officers were elected for the ensuing year:—

Chairman—J. G. Legrand.

Executive Committee—W. A. Duff, W. L. MacKenzie, D. A. Ross, Frank Lee.

Secretary-Treasurer—E. Brydone-Jack.

Members of Branch

The total number on mailing list of the Branch is about one hundred and seventy-five.

E. Brydone-Jack,
Secretary-Treasurer,
Manitoba Branch, C.S.C.E.

January 24th, 1913

On motion this report was adopted.

Report of the Ottawa Branch for the Year 1912

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen:—

The Managing Committee of the Ottawa Branch of the Society begs to submit the following report for the year 1912.

Membership.—Total Membership of this Branch at the close of the year was 279, of whom 3 were Honorary Members, 52 Members, 119 Associate Members, 9 Juniors, 72 Students, 24 Ottawa Branch Associates. There is no change in number of Honorary Members and Members, an increase of 19 Associate Members and 7 Juniors, a decrease of 3 Students and 5 Ottawa Branch Associates, making a total increase since our last report of 18 or 7%.

We regret to report the death of one of our Members, Mr. J. A. MacDonald.

Annual Meeting.—The Annual Meeting of the Branch was held on the 2nd October and the following officers were elected for the year 1912-13:

Chairman—R. F. Uniacke.

Secretary-Treasurer—H. Victor Brayley.

Managing Committee—Lieut.-Col. W. P. Anderson, C.M.G., G. B. Dodge, A. R. Dufresne, A. B. Lambe, John Murphy.

At a meeting of the Managing Committee, the work was allocated to four sub-committees as follows:—

Papers—W. P. Anderson, C.M.G., Chairman.

Library:—G. B. Dodge, Chairman, J. B. Challies, M. F. Cochrane, F. J. Delaute, W. W. McLachlan.

Entertainment:—John Murphy, Chairman.

Rooms Committee:—A. R. Dufresne and A. B. Lambe.

Meetings

The following Papers, Lectures, etc., were given during the year:—

Wednesday, 3rd January—Paper by Dr. P. H. Bryce on "Physics of Mechanical Refrigeration."

Wednesday, 17th January—Paper by Mr. Douglas Nelles on "The Projection of the 141st Meridian to the Arctic Ocean."

Wednesday, 7th February—Paper by Mr. C. P. Edwards on "Wireless Telegraphy."

Wednesday, 21st February—Paper by Mr. F. C. Nunnick on "The Work of the Lands Committee of the Commission of Conservation."

Wednesday, 6th March—Paper by Mr. A. A. Dion on "The Choice of Current, and the Choice of Motors in Electrical Installation."

Wednesday, 20th March—Paper by Lieut.-Col. W. P. Anderson on "Aids to Navigation."

Wednesday, 3rd April—Paper by Commander Howe, R.N., on "The Use of Oil Fuel in Warships."

Thursday, October 31st—Paper by Mr. C. R. Coutlee on "The Panama Canal."

Thursday, November 14th—Paper by Mr. Russel S. Smart on "Patent Law from an Engineer's Standpoint."

Thursday, November 28th—Paper by Dr. Howard T. Barnes, F.R.S., Professor of Physics, McGill University, on "The Physical Properties of Icebergs."

Thursday, December 12th—Paper by Mr. S. B. Johnson on "River Flow."

Business Meetings

Wednesday, January 31st—This meeting was called to discuss business matters pertaining to the Annual Meeting of the Society held in Montreal the previous week.

Thursday, 2nd December—Meeting called to discuss proposed amend-

ments to by-laws. Each amendment was thoroughly discussed, no action being taken as a body, it being left to individual members to vote as they saw fit.

Wednesday, January 10th—An informal dinner was held at the New Rathskeller.

The Ottawa Branch was invited to co-operate with the Committee appointed by Council in entertaining the Members of the International Congress of Navigation on its visit to Canada in June, 1912, a Committee with Mr. S. J. Chapleau as Chairman, prepared a programme for the day, which was successfully carried out, ending in a banquet tendered the delegates by the Dominion Cabinet. It is hoped that the Council will induce the Congress to hold their next Convention in Canada.

The attendance at the meetings remains about the same as in former years.

The Branch has received $575.50 on account of refunds and have a deficit of $216.51 at the end of the year, which demonstrates the insufficiency of our present income. It is hoped that the by-law affecting students over 23 years of age will be rigidly enforced thereby largely increasing the number of members in the higher classes.

Headquarters—Although our room is much too small for our meetings, owing to our insufficient revenue, we are compelled to remain in our present quarters. The Ottawa Branch is badly in need of larger and more suitable rooms but cannot procure them unless more assistance is given us by the Main Society.

A large number of our papers have been illustrated by lantern slides. In such cases we have had to secure accommodation in the Assembly Hall of the Normal School, or in the Carnegie Library. On account of the general interest of the subject, some of the meetings have been attended by ladies, who have shown much interest in our meetings.

A larger number of periodicals have been subscribed for and back numbers have been bound. More book cases are needed but lack of funds debars purchasing at present. Our members feel the lack of even a small reference library.

We would like to see subscriptions for our periodicals sent out from Headquarters in order that the Branches may participate in any discounts received by reason of a larger number of subscriptions being paid from one source.

It is gratifying to note that some of the papers read before this Branch are being printed in the Transactions of the Society. It is hoped that the Branches will be able to contribute further to the usefulness of the Society.

Mr. James White has again been elected by the Branch to be their representative on this Committee.

On the request of Mr. White, a letter ballot was sent to the Members on 27th May asking them to vote for one member whom they desired to have placed on the ballot for election of Councillor for District No. 4, the two members polling the largest vote to be nominated for Member on

Council. As the vote resulted in a tie, Messrs. Chapleau, Dion and Dodge were duly nominated. The two candidates whose names appear on the ballot were the choice of the Nomination Committee for District No. 4.

All of which is respectfully submitted.

R. F. UNIACKE, Chairman.
H. VICTOR BRAYLEY, Hon. Secy.

TREASURER'S REPORT, 1ST OCTOBER 1911 TO 1ST OCTOBER, 1912
OTTAWA BRANCH

Revenue

Subscription ($2.50) towards furnishing rooms	$2.50
Fees from Ottawa Associates	50.00
Refunds from Main Society	500.00
	552.50
Cash on hand, 1st October, 1911	3.49
	$555.99

Expenditure

Towards furnishing rooms	$118.49	
Rent	85.00	
Light	48.65	
Meetings, Correspondence, postage, notices, etc.	218.90	
Library	10.05	
Caretaker	60.00	
Sundries and telephone	14.80	
	555.89	
Cash on hand, 1st October, 1912	.10	
		$555.99

On motion this report was adopted.

THE REPORT OF THE TORONTO BRANCH FOR THE YEAR 1912

The executive of the Toronto Branch of the Canadian Society of Civil Engineers begs to submit the following report for the year 1912.

We regret to record the death of two former Chairmen of the Branch, Messrs. E. H. Keating and Cecil B. Smith; we also regret to record the death of Mr. C. Beresford Fox.

The Toronto Branch continues to have its quarters in the rooms of the Engineers' Club, 96 King Street West, which arrangement has proved

satisfactory both to the Engineers' Club and to the members of our Branch. We pay the former $50 a year for the privilege of holding a monthly meeting, and they have provided a book case for our library. The books are available at all times to members of the Canadian Society of Civil Engineers as well as to members of the Engineers' Club.

Only three meetings have been held this year on account of lack of interesting papers. On March 28th, Mr. R. F. Stupart, Director of the Dominion Weather Bureau, Toronto, delivered a particularly interesting address on "Storms in the Northern Hemisphere." On February the 22nd a discussion took place on the proposed standard specification for "Roadbeds and Ballasting, Good Roads and Steel Bridges." On November the 28th, Mr. E. L. Cousins, engineer of the Board of Harbour Commissioners, delivered an address on the proposed harbour improvements and illustrated it with a large number of plans and sketches. Over two hundred members and guests were present at this meeting. The capacity of the assembly room was severely taxed on this occasion. Mr. Cousins has promised to prepare a paper on the same subject for the Transactions. During the year the members of the Branch were guests of the Toronto section of the American Institute of Electrical Engineers, when Mr. Julian C. Smith gave an address on "Power Transmission"; also at a meeting of the Canadian Manufacturers Association, when Mr. Franklin H. Wentworth, of Boston, read a paper on "Fire Prevention."

In June on "New Ontario Day," the executive Committee of the Branch were guests of the Toronto Board of Trade at a luncheon served at the Arena to the new Ontario delegates.

At the request of Headquarters the Branch arranged a program for the entertainment of the delegates of the International Congress of Navigation. They were met on their arrival at Port McNicholl on the morning of the 13th of June by representatives of the Toronto Branch and the harbour was inspected. A special train brought the visitors to Toronto where street cars were waiting to convey them to King Edward Hotel for luncheon. Afterwards they adjourned to the Yonge Street wharf where the members of the Royal Canadian Yacht Club placed sailing and steam yachts at their disposal for a tour of the harbour. At a dinner offered by the Board of Harbor Commissioners at the Island quarters of the Royal Canadian Yacht Club speeches of welcome were made by Commodore Aemelius Jarvis on behalf of the Yacht Club, Controller H. C. Hocken, on behalf of the City of Toronto, Mr. Lionel H. Clarke, on behalf of the board of Harbor Commissioners, and Mr. G. T. Somers, President of the Toronto Board of Trade to which Baron Sanguist de Teulada and M. de Thierry of Belgium responded. The party returned to the City about 10 o'clock.

On the morning of Thursday, June the 14th, the delegates inspected the City in automobiles provided by the Toronto City Council, and afterwards were the guests of the City Council at a luncheon, Mr. G. R. Gerry,

the Mayor, presiding. The party left at 2.30 p.m. on the Richelieu and Ontario Navigation boat for Prescott.

The attention of the executive this year has been occupied in adding to the library. They were fortunate to secure Mr. Parker H. Kemble as Chairman of the library Committee, he having had considerable experience in library work. To date there are one hundred volumes in the library and more are being ordered.

A card index is being prepared which will show our members what works on engineering and science are available, not only on our own shelves, but also in the Toronto Public and University of Toronto libraries.

The officers for the year 1913-14 are:

Chairman—E. A. James.

Secretary—Allen Garrow.

Executive Committee—E. T. J. Brandon, Parker Kemble, W. A. McLean.

T. R. LOUDON, Hon. Sec.-Treas.

T. C. IRVING, Jr., Chairman.

REPORT OF THE QUEBEC BRANCH FOR THE YEAR 1912

On behalf of the Quebec Branch, I have the honour to present the following report on the proceedings of that section of the Society during the year 1912.

The Officers elected on the 17th January, 1912, were as follows:—

Chairman—W. D. Baillarge.

Secretary-Treasurer—A. Amos.

Councillors—Messrs A. R. Decary, J. C. Pigot, J. F. Guay.

The elections for the present year took place on the 20th January, and the following officers were elected:

Chairman—A. R. Decary.

Secretary-Treasurer—A. Amos.

Councillors—Messrs. W. D. Baillarge, P .. Parent (Past Presidents), J. F. Guay, S. S. Oliver, H. Ortiz.

The Branch has at present a membership of 62 as follows: Members and Associate Members 47; Associates 3; Juniors and Students 11. This being a decrease of one over last year.

On the other hand six members were admitted—Messrs. H. Ortiz, I. E. Vallee, A. B. Normandin, D. S. Barton, L. R. Ord, C. Belanger.

Our section held eight meetings during the year 1912.

Several papers submitted by the Committees of the Society were discussed at our meetings. The result of these discussions as drafted in the form of resolutions which were tarnsmitted to headquarters, and copies of which are annexed to this report.

The Members of this Branch had somewhat of a disappointment as regards the International Navigation Congress which toured the United

States and Canada last summer. The Branch had been requested to prepare a programme, but it was found that, after the Provincial Government and the City authorities had been approached with a view of sharing in the entertainment, Head-quarters Committees could not afford any subscription to this end from the Federal Government grant. The programme was therefore cancelled and the Members of the Congress could not be entertained in the old capital for lack of funds.

In concluding, I beg to draw the attention of the Members of the Society to the motion made by the Vancouver Branch in which allusion is made to the report of Council page 12. The Quebec Branch is of opinion that it is time that the Society should take steps in this regard, and a motion has been forwarded to that effect.

The Quebec Branch will continue to occupy their quarters in the City Hall, available through the kindness of the Municipal authorities.

I now beg to communicate the following resolutions which were forwarded to the Council during the year:

Resolution of the 29th of February, 1912

The views of the Members of this Branch are that the reports of committees on Roadways, Roadbed and Ballasting and Steel Bridges, submitted to them for an expression of opinion, are valuable inasmuch as they lay down certain rules for the guidance of engineers. The time at their disposal is, however, too limited for them to approve of all or take exception to any of the clauses of the several reports; but as the purpose of these reports is simply for guidance and not to provide absolute rulings on all cases, the Members of this Branch feel that engineers are at liberty to alter certain clauses to fit peculiar cases which may have to be decided by them, and therefore they recommend that the reports as a whole be adopted

Resolution of the 7th of February, 1912

Whereas it is the opinion of the Members of this Branch of the Can Soc. C.E. that the standard of education of civil engineers should be raised to a higher level;

Whereas the local Legislatures only h . the right to legislate in matters of education;

Whereas laws have been enacted by the Province of Manitoba and Quebec which if carried out would be of great benefit to C.E. as a body;

Whereas it is of the utmost importance that similar laws be enacted in all the Provinces so that action may be taken in regard to the admission of qualified men only in the ranks of the Society.

Resolved: That the parent Society be requested to take the necessary means to have such laws enacted in all the Provinces where this has not already been done.

That the Secretary of this Branch be instructed to send copies of this resolution to the parent Society and all the Branches asking for their co-operation.

Resolution of the 4th of March, 1912

After taking cognizance of the circular from the Ottawa Board, dated February 13th, 1912, the Members of the Quebec Branch do not favor the proposal to distribute the money received from the sale of the Montreal property among the Branches in the manner stated. After due notice being given the question was discussed and disposed of at the last annual meeting. Any objections could have been raised at that time, and we think that any resolutions of regret at the action taken at the Annual Meeting would have no effect.

We are in favor of first applying the proceeds of the sale of the present property in Montreal to procure a suitable and commodious Head-quarters building, and worthy of the profession that is contributing so much to the advancement of this country, and after the accomplishment of that object any surplus might be applied to the Branches. At present we do not think that the policy of dividing up the building fund to be distributed in small amounts would benefit the Society.

The refund of 50% of the Branch Members' fees is however recommended.

Resolution of the 14th of December, 1912

1st. This Branch entirely concurs with the views and recommendations of the Council (Local Council) in expressing its opposition to the proposed amendment to By-law 20, which calls for authorization to increase the annual fees;

2nd. The Members are of the opinion that the expenses of the parent Society should be kept down so as to remain within the present income, and respectfully request the President and Council of the Society to take the necessary steps to that effect;

3rd. They express the hope that the other Branches of the Society will take a similar view, and for that purpose, the Secretary is requested to send copies of the motion to sister Branches.

The morning session adjourned at one o'clock.

Afternoon Session, January 28th, 1913

The Meeting re-assembled at 3 p.m., the President, Mr. W. F. Tye, in the Chair.

Mr. Robinson — Mr. Robinson moved that the report of the Ottawa Branch be adopted in so far as it dealt with matters pertaining to that Branch.

Mr. Mountain — Mr. G. A. Mountain asked what was being done regarding the large number of Students resident in Ottawa who had reached the age limit and were, therefore, no longer eligible to remain in the Society unless they were transferred to a higher grade.

The Secretary — The Secretary read a circular letter which had been sent out to all Students who were no longer eligible to remain in the class of Students,

notifying them that unless they applied for transfer before March 1st next they would be removed from the roll of the Society, and explained that Students could not under the By-Laws be transferred unless they personally applied therefor.

The President pointed out that the officers of the various Branches might assist in having the Students in question make the necessary application. The President

Mr. James White suggested that it might be desirable to change the By-Law so that Students could be transferred to the Junior class without this application. Mr. White

Mr. T. C. Irving asked if the Ottawa Branch was doing anything to have the very interesting papers read before their Branch published in the Transactions. In Toronto they were having great difficulty in getting papers, the members there apparently being very busy, and the Toronto Branch was rather envious of Ottawa's success in this respect. Mr. Irving

Mr. R. F. Uniacke stated that it was their endeavour to get all those who had read a paper or given addresses before the Ottawa Branch to put them in such form that they could be submitted to the Committee on Papers for publication in the Transactions, and in several cases papers had been accepted. A good many of the papers and lectures were, however, of such a character that they were not available for publication. Mr. Uniacke

Mr. Robinson's motion having been seconded was put to the Meeting and carried.

The President stated that the Auditors had now presented a corrected statement indicating some clerical errors in the printed copy. On page twenty-three under receipts the figure $539.72 should read $539.27; and on the next page under the head of both "Receipts and Expenditures" the totals should be on both sides $75,141.84, not $85 141.84. With those changes the report was correct. The President

The President remarked that there was a good deal of room for discussion regarding this report and called attention to the necessity of either providing for an increased income or a reduction in expenditure. He trusted the proposed increase scale of fees would be adopted, as otherwise the Society would be in an embarrassed position.

Mr. H. H. Vaughan, Vice-President, spoke as follows in connection with the proposed increase in fees and the finances of the Society:— Mr. Vaughan

"We have prepared some figures in connection with this matter which I would like to present in order that those present, particularly the representatives of the Branches, may be better informed as to the idea of the Council. We have compared the American Society of Electrical Engineers, the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and our own Society.

"The collections per member are:—for the American Society of Electrical Engineers, $11.00; the American Society of Civil Engineers, $18.00; the American Institute of Mining Engineers, $9.50; the American Society

of Mechanical Engineers, $17.25; the Canadian Society of Civil Engineers, $7.00

"The salaries paid per member are:—for the American Society of Electrical Engineers, $2.25; the American Society of Civil Engineers, $5.20; the American Institute of Mining Engineers, $4,70; the American Society of Mechanical Engineers, $9.70; and the Canadian Society of Civil Engineers, $1.70.

"The printing per member is:—for the American Society of Electrical Engineers, $3.50; the American Society of Civil Engineers, $5.75; the American Institute of Mining Engineers, $4.60; the American Society of Mechanical Engineers, $10.70; the Canadian Society of Civil Engineers, $2.30. In most American Societies our Associates would be the same as their Associate Members, who are men interested in the different professions but not actively engaged in them; ours are actively engaged but not of sufficient experience to be in the class of Members. If we compare our Associates with the American Society of Civil Engineers' Associate Members, we find we are asking $15.00 for residents and they are asking $25.00. So even with this increase we are still well below other Societies of anything like an equal status, and the proposed scale of fees is not going to give us any more income than is necessary to carry on the affairs of the Society properly.

"I really think the scheme of giving Branches the option to increase the fees of their members so as to provide local funds for the Branch will practically put their receipts on an equality with those of headquarters.

"The Council has recommended that the radius of Branches be changed from fifty to twenty-five miles with the idea that if a Branch increases its subscription to $15.00 it might be very unfair to a member who is living thirty or forty miles away to pay $15.00 instead of $10.00, the non-resident rate.

"Both Branch and Headquarters members will, under this new schedule, get more out of the Society in proportion to what they put into it than the non-resident members."

Mr. Uniacke

Mr. R. F. Uniacke pointed out that it would be very difficult if not impossible for a Branch to increase its scale of fees under the wording of the proposed By-Law which required a two-third majority of all the members. If it were two-thirds of the members present at a meeting of which due notice had been given, it might be practicable to vote the increase.

Mr. Vaughan

Mr. Vaughan admitted that Mr. Uniacke's point was well taken and that the By-Law should be amended to read so that after due and proper notice a two-thirds majority at the meetings should effect the change.

Mr. Coutlee

Mr. C. R. Coutlee remarked that it was quite necessary that the Ottawa Branch should have a large fund at its disposal in order to get proper accommodation. The present quarters were eminently unsuitable.

Mr. Irving

Mr. T. C. Irving asked if it were not possible for the Ottawa, Vancouver and Winnipeg Branches to copy what had been done in Toronto,

where an Engineers' Club furnished headquarters for the Branch which was managed as an adjunct to the Club.

Mr. Breithaupt urged the importance of making the central organisation as strong as possible; that there should be sufficient funds to maintain a dignified building and a well paid and adequate staff. Mr. Breithaupt

Mr. J. W. Harkom desired as a non-resident member to put himself on record as one who thought that he got full value for his money and that no one should object to the proposed increase in dues. He sympathised with the branches which in his opinion were a very vital part of the organization of the Society. Mr. Harkom

Mr. Vaughan supplemented his remarks as to the effect of the proposed revision of fees by saying:—"The increase arising from additional fees payable by members at headquarters will be as follows: 155 members at $5.00, 400 Branch Members at $2.00, and 300 non-resident Members at $2.00 or a total of $2,175.00 would be the estimated increase to headquarters on the general business of the Society, including all the general expenses; so it is not very much. It will add 12% towards the cost of operating the Society." Mr. Vaughan

Mr. Robinson expressed the opinion that such an increase was not sufficient. He thought that the membership of the Society would be vastly increased because of the large number of engineers who were not of the Society and who were to-day practising their profession in Canada. Mr. Robinson

Mr. Robinson further suggested a convention of representative members from the various districts with the view of considering such amendments to the By-Laws and Constitution as would re-organize the Society so that it might be a replica of the Constitution of the Government of Canada.

Mr. Mountain challenged the statement of the last speaker as to there being any very great number of engineers in the country who were not members of the Society. In the speaker's opinion the Society was representative of the practicing engineers of Canada. Mr. Mountain

The President said that while this discussion had been to a certain extent out of order, it was an important one. Canada was growing at a tremendous rate, and this Society wished to keep pace with the growth. The cost of living in every way was increasing. It might be the cost of high living, not the high cost of living, but whatever it was, it had the same effect on the Canadian Society of Civil Engineers as it had on everybody else, and more revenue was necessary. The discussion which had taken place would serve its purpose, and was one of the most important which could have taken place at this meeting. The main Society wanted to do everything possible for the branches, and it was thought that no other Society of engineers was doing anything like as much. The President

Mr. R. B. Rogers remarked that if those members, who had complained they were not getting value for their money and had criticised the Council, would make suggestions whereby the wellbeing of the Society would be enhanced, the Council, he knew, would be only too glad to co-operate. Mr. Rogers

The President

The President in concluding the discussion said, "At every annual meeting for some time past we have had this kind of discussion. The only unfortunate thing is that every critic has vague generalities of what the Council ought to do, but they do not say what the Council should do. We are anxious to do anything we possibly can. I have been on the Council now for a good many years, and I think I can safely say that every Councillor is anxious to do everything in his power to improve the Society. We are willing to accept any suggestion whatever that seems to have any merit in it, but vague generalities do not help us at all."

Mr. Mitchell

On motion by Mr. C. H. Mitchell, seconded by Mr. J. G. Legrand, the financial report as corrected was adopted.

Mr. Mountain

Mr. Mountain moved that the Vice-President, Mr. Vaughan, take the chair during the reading of the President's address. The motion was seconded and carried.

Mr. Tye then read the following address:—

PRESIDENT'S ADDRESS

GENTLEMEN :—

In rising to comply with the time-honored custom of reading the President's address, I beg to thank you for the high honor you have conferred on me in electing me to the Presidency of our National Society.

Owing to my residence in Toronto, and to my absence in Europe during the first part of the year, I was unable to attend many of the Council meetings. The affairs of the Society were, however, so well looked after by the Council and our efficient Secretary, that I am sure the absence of the President was not felt.

I have great pleasure in congratulating the Society on its continued growth. Our Membership now amounts in all to over 3,000, and includes almost every engineer in the country. The expansion of the Society is a thing of which we must all feel justly proud. We have grown so rapidly that our old home has become too small for us, and we were very fortunate in being able to dispose of it on such advantageous terms at the very moment when a change had become necessary.

Our thanks are due to the Building Committee for the efficient and expeditious manner in which they have prepared a new residence for us; and I must congratulate the Society on the result of their efforts.

During the year the Council suffered a severe loss in the death of their friend and colleague, Mr. James N. Shanly. Mr. Shanly was a capable, conscientious engineer, and a favorite with all with whom he came in contact. He took a keen and intelligent interest in the Society's affairs. He was Chairman of the Finance and Building Committees, and much of the success of our new home is due to his untiring efforts.

When looking around for a subject on which to address you, my thoughts turn naturally to Railway Location, on which a great part of my professional career has been spent.

Transportation is one of Canada's greatest problems ; our country is of vast area, the distances are great, the population sparse, and the traffic light, making the mileage and cost of railways high per head of population. On the other hand the growth of the country is and will continue to be rapid. A great problem is thus presented: how to build our railways that they may not be too expensive for our present requirements, and yet be capable of improvement to fit our future needs. Economics of Railway Location is, therefore, of even more than usual importance to Canada. The subject is so vast that it is only possible in such an address to touch its outer fringe; but it is so important to us all that even a few rudimentary remarks may be interesting.

While railways are built to serve the traffic requirements of the country, the immediate object of the promoters and builders is to make a profit, either on the construction or operation. This is undoubtedly true when built by private parties. When built by a Government, it is with the end in view that the people may make money either directly through the operation of the railway, or indirectly by the reduction of rates. It is, therefore, of prime importance that the engineer, whether he be working for private parties or for a Government, locate and construct the most economic road. The most economic road is not necessarily either the cheapest or most expensive, neither is it necessarily the one which may be operated at the least cost—it is in reality the one which is the most effective commercially or the one which will enable its owners to transport the largest amount of traffic at the lowest cost.

In order to ascertain that a railroad is most effective commercially, the features which underlie its commercial effectiveness should be understood. These are:—Gross Earnings, Operating Expenses, and Fixed Charges; and are of importance in the order named. Gross Earnings, which depend on the amount of traffic handled, is undoubtedly first. It is never advisable to build a railway unless there is or will be sufficient traffic to pay the Operating Expenses and the Fixed Charges, no matter how cheaply or how well it can be built.

In new countries, such as most Canadian railways are built through, there is rarely sufficient traffic in sight to justify the construction of a road, so the promoters—whether they be a Government or private parties—must have faith in the project and must be able to justify to themselves, and to the investing public, the possibilities of paying dividends.

Engineers are sometimes, though rarely, consulted in the early stages of the project to report on the traffic possibilities of the route. The usual way is for the promoters to decide for themselves that a road between certain terminals is commercially desirable, and that there is or will be sufficient traffic on such a route to justify its construction. Engineers are then employed to survey and construct the road. The question should at once arise with the engineer—how the railway can be so located as to make it the most effective commercially, or how to get for the promoters the most profitable traffic. No matter how this problem is stated, it finally

resolves itself into this:—if the promoters be private parties, how can the road be so located and built that the most interest can be earned on the money invested—or if a government, to transport the most traffic at the least cost? The answer in either case would be the same, for, if it is so located that it may handle the most traffic at the least cost, it will, if properly managed, make the most interest on the money invested.

The first problem the engineer has thus to face is how he can so locate the road betweer the given terminals as to get the most profitable traffic. The route which takes in the greatest number of towns, or which goes through the best land, if the country be unsettled, should be the first examined. A mistake frequently made is to locate the road within a mile or two of an important town in order to decrease distance or avoid expense. The cost of handling traffic is the total cost from the door of the consignor to the door of the consignee, and rates on that basis must be equal. The added charge for cartage is at times so large as to wholly destroy the business of the badly placed line and give it to a competitor more favorably situated, or if it be not wholly destroyed, the additional cartage and delivery charges eat up the profits.

Where traffic is light, and train loads less than the rated capacity of the locomotive, the cost of handling additional traffic is much less than is the ordinary train mile cost. It should be figured in equating the value of a change in location which increases traffic at 50% of the usual train mile cost. In this respect it should be remembered that deviations from the direct route do not always materially add to the length of the line.

In order to locate a railway so that it may be commercially effective it is first necessary to know what the volume of traffic is likely to be, whether it is immediately available, and at what rate it is likely to grow. The best way to ascertain this is by comparison with roads through the same or a similar country. A road through a country most nearly approximating that to be traversed should be selected for examination, and its traffic for previous years studied. If, for any reason business is likely to be materially greater or less than on the road under examination, due allowance should be made.

All railways are now required to make yearly reports to the government, and such statistics should be examined as well as those published in the Railway Companies' Annual Reports. The average train load and the ruling grade should be studied, and finally the average number of trains per day should be ascertained. It must be remembered that though the traffic is rarely balanced, that is, that there is seldom as much tonnage moving one way as the other, the number of trains each way must within narrow limits be the same. It is not always easy for an outsider to ascertain the number of trains over any given railway, as railway statistics are not published in this form, but every effort should be made to arrive at it as closely as possible.

Having obtained this information, and having determined how the traffic on the proposed road will compare with that on the road under

examination, some approximation of the ruling grades on the road in view should be arrived at. If different from those on the route with which comparison is being made, the number of trains per day each way on the proposed road should be increased or diminished accordingly.

While this method of ascertaining the number of trains per day is only approximate, it is certainly much more accurate than to attempt to make an independent estimate of the gross tonnage on the new road. The rate of growth of traffic should be similarly ascertained, as a railroad should be built not only to take care of the present traffic but also that of the road in the reasonably near future.

Cost per train mile is the basis of all economic comparison, as the effect of the number of trains on the cost of operation is much more direct than is the actual tonnage handled. The cost per train mile should thus be ascertained with reasonable accuracy. The Annual Reports published by the Railway Companies usually give these figures; if not, the reports of the Inter-State Commerce Commission give this information for every railroad in the United States. From this mass of statistics the train mile cost of the most nearly similar road should be taken and assumed as the train mile cost of the proposed road. It must also be remembered that these costs are increasing rapidly, the average for the whole United States for the year ending June 30th, 1896, being 95 cents, while for the year ending June 30th, 1910, it had increased to $1.49.

Equipped with this information as to the sources of traffic, the estimated average number of trains per day, and the probable cost per train mile, the engineer is ready to make a reconnaissance of the country to be traversed. The reconnaissance should always be of an area rather than a line. An area wide enough to take in any possible line should be examined. All combinations of probable lines should be studied. As the reconnaissance proceeds a map of the country should be made showing the details of the topography by contours ten to fifty feet apart; the elevations of controlling points should be shown with the greatest attainable accuracy. From such a map carefully prepared all lines and combinations of lines can be studied. Approximate condensed profiles can be drawn, and distances, grades and costs can be approximately asscertained. With such information, the choice of routes can usually be narrowed down to one or two or in rare instances to three lines over which it is necessary to run surveys.,

The value of a proper reconnaissance cannot be too strongly insisted upon. It is owing to the lack of it that the graver errors of location are usually due, such as the selection of an improper route or ruling grade, passing of traffic centres, &c. There is no way in which money can be so profitably spent. Great pains should be taken to secure the most expert engineer for this class of work. In engineering and economic importance reconnaissance far outranks location or construction. It is not an exaggeration to say that for every dollar which an engineer can save on construction, he can save five on location, and ten on reconnaissance.

The really essential factor in a location made for freight traffic is the ruling grade. The maximum is not always the ruling or limiting grade, as it might be operated by the aid of a helper engine, in which case it may not limit traffic. A very long grade of a lower rate may, by taxing the boiler capacity, become the ruling grade instead of a shorter steeper one. To ascertain the economic value of any change in grade, or to compare two different grades, the number of round trips per day required to handle the given or estimated traffic should be ascertained. The difference will be the saving in trains each way per day. This multiplied by the ascercertained cost per train mile, by twice the length of the Division in miles and the number of days in the year, will give the annual saving. Capitalizing at the proper interest rate will give the capitalized value of the better grade. If the additional cost is not greater than the capitalized value when properly equated for distance, rise and fall, curvature etc., then the lighter grade is an economic one, and should be adopted.

As many items of expense will not be affected by changes in the number of trains, the saving per train mile for a train eliminated is not as great as the cost per train mile for the entire traffic. The saving is in reality in the neighborhood of 50%, and this percentage of the ascertained total train mile cost should be used in estimating the economy due to a difference in ruling grade.

In figuring on the economics of a grade reduction on an old road where the traffic and the average number of trains per day are known, it is essential that the actual loads hauled by each locomotive be determined and compared with their rated capacities. This difference is due to the inability of the operating officials to get perfect results. This "personal equation" must be taken into consideration in figuring the number of trains per day with the new grades, as they will no more be able to get the best results under the new conditions than they were with the old. In making a reduction from a high rate to a low, for instance, from a 1% to a 0.3% or 0.4%, it must not be forgotten that the proportion of the actual loads to the theoretical rating will be lower on the low grades than on the high. Time is an essential factor. On a 1% grade in good weather, the actual loading may usually be made 90% of the theoretical, while on 0.3% it is unlikely that more than 75% of the rating can be hauled if time is to be made.

The proportionate amount of ruling grade on the Division has also an important bearing on the loading of trains, the greater the proportion its length bears to the length of the Division, the lighter the actual train loads must be, and this too must be taken into consideration in determining the average number of trains per day required to handle the traffic on the proposed new grade.

Serious error would undoubtedly arise if the theoretical number of trains required to handle the traffic on the proposed new grade were compared with the actual trains on the present one.

While Fixed Charges—which are largely determined by the "Cost of Construction"—are of lesser consideration than Operating Expenses, they are still of prime importance. No road can pay dividends to stock holders, or afford to reduce freight rates until its Fixed Charges are met. So it is of the greatest importance that the engineer introduce no features that will increase the cost of construction without reducing the Operating Expenses by at least as great an amount as the interest on the added cost. The cost of moving a given tonnage being the sum of the Operating Expenses and the Fixed Charges—it follows that a reduction in the cost which does not increase the Operating Expenses is only of less importance than one which reduces the Operating Expenses without increasing the cost. Such a reduction in cost is a practical improvement to the standard of the road, as it increases the margin between receipts and expenditures, and so permits of an increase in dividends, or has a tendency to permit of a reduction in freight rates, if that be the object aimed at.

In Canada most of the new construction is through districts which at the time of completion furnish but little traffic: much railway has been built on which the traffic did not justify even one daily freight train per day each way. It is a safe statement that 80% of the mileage constructed in Canada would not furnish at the date of completion traffic sufficient for two freight trains each way per day. Under such conditions, the receipts are low and the Operating Expenses high, and it is of the utmost importance that the construction cost be kept low. On the other hand, the country is growing fast, and traffic is increasing rapidly. It is thus necessary that the engineer keep always in view the almost certain necessity of a good road in the future. He should, therefore, so locate and construct his line that the first cost be low, and that the standard may be raised, when necessary, without unduly increasing the total expenditure. In order to get the very best results, the line giving best grades, alignment etc., should always be first located. From this, as a standard, the engineer should work to the final or economic location. Working from a poor to a better is apt to lead to grave errors.

Where low construction costs are necessary, and it is probable that a high standard will be required in the future, it is much more effective and advisable to use short sections of temporary line with steep grades, sharp curves etc., on the heavy or difficult sections, maintaining the higher standard for the light or easy portions of line, than it is to adopt a generally lower standard for the whole route. The first cost of the former will probably be less; it may be operated with helper engines as the traffic increases, and may be improved when advisable, while the cost of improving a generally poor road is frequently prohibitive.

The use of sharp curves with short tangents is often a very effective means of reducing cost without materially increasing the operating expenses.

The effect of moderately sharp curvature is essentially different from steep grades, inasmuch as it is not limiting in its effect. The use of one sharp curve does not justify the use of another just as sharp—whereas the use of one ruling grade on a division does justify another as steep.

The use of curves up to 14 degrees does not increase the maintenance or operating expenses. A mile of road in which there are 100 degrees of 10 degree curve, the balance being tangent, does not cost any more to maintain and operate than the same length of road with 100 degrees of 2 degree curve—in fact, if there is any difference, it is in favor of the sharper curvature.

Unless the curvature is so sharp as to be limiting in its effect, there is no serious objection even on the best class of road to a few sharp curves where the amount saved by their use is sufficient to justify their introduction. The conditions which cause curves to be limiting are when they are so sharp as to prevent the use of the higher grades of modern equipment, and when they limit the haulage capacity of the locomotives, or their speed.

Modern equipment is so constructed as to traverse safely 14 degree curves, and much sharper with guard and hold up rails. The standard compensation for curvature on grades is 0.04 foot per degree. A 10 degree curve is thus equivalent, as far as resistance is concerned, to a 0.4% grade; and a 15 degree curve to a 0.6% grade. On a 0.4% it is only necessary that the grade on a 10 degree curve be made level in order that the resistance be not increased. The same thing applies to a 15 degree curve on a 0.6% grade. It is, therefore, evident that on a road whose ruling grades are 0.4% 10 degree curves are not limiting to the haulage capacity of the locomotives, nor are 15 degree curves on a 0.6% grade.

The easy riding speed is dependent on the amount of the allowable elevation of the outer rail. If the maximum be set at six inches, this speed per hour would be :—

on a 3 degree curve		60 miles	per hour
" 4	"	50	"
" 6	"	40	"
" 8	"	35	"
" 10	"	30	"

The safe or allowable speeds would be 10 miles per hour greater.

With the track properly elevated, equiped with tie plates kept in good line and surface, and curves provided with proper easements, 10 degree curves are no more disagreeable to ride over at speed of 30 miles per hour than are 3 degree curves at 60 miles per hour.

The reduction in speed for one mile from 50 to 30 miles per hour only means the loss of 0.8 minutes. To take an extreme case—the Twentieth Century Limited runs from New York to Chicago, 980 miles in 20 hours, or at an average of 49 miles per hour. The introduction of one hundred 10 degree curves each one of which required a slacking of speed to 30 miles per hour for a distance of one mile would increase the running time of such a train by one hour and twenty minutes. Such an increase on a road 1,000 miles long would in nine cases out of ten have no ill effect. A 10 degree curve so long as to require the reduction of speed to an average of 30 miles per hour for a mile would in practice be a very rare occurrence.

It is evident the use of curves as sharp as 10 degrees does not prohibit the employment of modern equipment or limit the haulage capacity of the locomotives. It has no effect on the speed of freight trains, or on passenger trains where the average speed including stops is not greater than 30 miles per hour. A few such curves only slightly affect the running time where speeds are high.

It is thus clear that a few curves not sharper than 10 degrees are not objectionable on the very best roads where their use results in large savings. As they are not limiting, the use of one such curve is no justification for a second. The introduction of many of them preventing the employment of high speeds for long distances would certainly be objectionable, but an occasional one where large savings result is justifiable on even the highest class of road.

Wooden trestles to replace heavy rock borrow embankments should be used. Such trestles may be designed to safely carry the heaviest class of equipment. When protected by the installation of the best available water supply they are quite safe, and are good for ten years. Such temporary construction also gives time to ascertain the correct requirements for water ways in new countries where there is frequently a dearth of information as to rainfall, flow of streams &c., and where unless unduly large water ways are left there is danger of washouts. This danger may be even greater than the danger from fire to wooden trestles. Their use instead of heavy rock borrow embankments is of great importance from an economic point of view. One dollar at 5% compound interest amounts in ten years to $1.63. If rock borrow costs on the original construction say $1.75 per cubic yard it will in ten years time have amounted with interest to $2.85. While, under anything like ordinary conditions train hauled earth embankments on an operated road, made when the trestles require replacement, do not cost over 30 cents per cubic yard, or less than one-ninth of the total cost of a permanent rock embankment made during construction.

Momentum grades are a great source of saving in cost without increasing the operating expenses. The use of momentum in overcoming short stretches steeper than the ordinary ruling grade is almost always justifiable. The exception is where the traffic is so congested that the possibility of a delay due to the failure of an occasional train to surmount the grade is more important than the undoubted saving in interest charges which they insure. It will probably be many years before conditions prohibiting their use prevail on any portion of our Canadian railways.

The foregoing are a few of the more important considerations which the locating engineer should keep in view. He should always remember that railways are commercial enterprises, are built for profit, and that the investors are looking for and are entitled to satisfactory interest on their money; and so far as the returns on their investments depend on location they will for a given traffic be the greatest when the sum of the operating expenses and fixed charges is the least amount.

Tuesday Evening, January 28th

A Smoking Concert was held in the lecture room of the new quarters of the Society, 176 Mansfield Street, under the direction of Messrs. H. H. Vaughan, C. N. Monsarrat and H. M. Jaquays, the Entertainment Committee for the Annual Meeting. The occasion brought together a large number of the members of the Society.

Wednesday, January 29th, 10 a.m.

A party of members, numbering upwards of 200, left the Windsor Hotel in special cars provided by the courtesy of the Montreal Tramways Company on a visit to the works of the Canadian Steel Foundries Limited, at Longue Pointe. The party was entertained at luncheon by the Company, and the Society is under obligations to Mr. K. W. Blackwell, M. Can. Soc.C.E., President of the Canadian Steel Foundries Limited, and to Mr. W. F. Angus, A.M. Can.Soc.C.E., General Manager of the Company, for many courtesies shown to the members of the party.

Wednesday Afternoon, January 29th, 1913

The meeting was called to order at 3. p.m., the President, Mr. W. F. Tye, in the chair.

The meeting took up the consideration of the Reports of Committees.

Mr. Mackay

Mr. H. M. MacKay, in the absence of the Chairman, presented the report of the Committee on Testing Laboratories. (See page 41). He stated that there was nothing of importance which could be added to the printed report, the changes, which were referred to, in the administration of the Department of Public Works having made substantial progress impossible.

Mr. Skaife

Mr. Lewis Skaife moved the reception and adoption of the report as a progress report and that the Committee be continued. The motion was seconded and carried.

The Report of the Committee on Educational Requirements was also presented by Prof. MacKay, and as Chairman of the Board of Examiners he said:—

Prof. Mackay

"Although the report of the Examiners' Board is short, the Board has done a good deal of work during the time it has been organized, the last ten months. The most difficult task was to draw up a syllabus of the examinations, because we had little guidance to help us in that respect, and we were rather between two difficulties, one to set a standard that would really mean something, and the other to make that standard such that no worthy applicant should be rejected. Whether we have succeeded in accomplishing that task I do not know. We certainly have so far to our own satisfaction, but we realize our work at present is only in the experimental stage. The syllabus of the examination should be drawn up and printed, and also a complete set of examination papers, which might serve as some indication of the standard required in Canada. Also a

set of examination papers should be printed on the subjects for which candidates presented themselves at the second examination. Two examinations were held. As there was but little time to prepare for these examinations, only a small number of candidates came up this year, most of whom I think succeeded in passing. We have also been called upon to examine a large number of certificates presented by men who, although they were not under the strict regulation exempt from examination, still were able to present certificates of educational acquirements which might reasonably be looked into and accepted. Some of these, of course, were accepted and some rejected, and that involved a considerable amount of work. I am sure all the members of the Board will be very glad to receive any suggestions to guide them in continuing the work. It is to the benefit of the Society that they should do so.

Dr. L. A. Herdt presented the report of the Committee of the Electro- Dr. Herdt
technical Commission, and in doing so stated that the Canadian Committee was appointed by the council of this Society to join with the Committee appointed by practically all the great countries of the world to form an Electrotechnical Commission, whose duty it is to standardize electrical symbols, and also to go into the matter of the standardization of electrical machinery. These committees appoint delegates to annual meetings which are held in different parts of the world. The last meeting was held at Turin, Italy; the next will be held at Zurich, Switzerland.

This Society was represented by a delegate sent from Canada to the last annual meeting of the commission. The recommendations of the different committees were considered, and some of them amended, others approved. Such work was of course, very slow, a great deal of it having to be done by correspondence, as no recommendation could be carried before it had been submitted to the different committees. Publications have been issued by the Commission, which have been submitted to the different committees for approval.

The largest amount of work has been done in relation to the standardization of symbols. It has hitherto not always been easy on taking up a text book on electrical matters to understand exactly what the different symbols used meant. The Committees have now practically settled on uniform symbols to denote the various terms in electrical machinery and electrical engineering.

Several committees have been appointed by the different countries, principally with a view of standardizing the rating of electrical machinery, so that when a machine is rated at a certain killowatt capacity, or horse power, the rating will have the same meaning throughout the world.

Dr. Herdt hoped that this report would be adopted by the meeting, and that the members of the Committee would be allowed to continue the work for the succeeding year. They would thus keep in touch with the subject, which was of great importance to Canada, as this country was becoming a large centre for electrical engineering.

Mr. Murdock — On motion by Mr. Murdock, the report was accepted and the Committee continued.

Mr. Monsarrat presented the report of the Committee on Specification for Steel Bridges.

On motion the report was received and the appointment of a Committee to continue the work referred to the Council.

Mr. Mountain — Mr. Mountain referring to the specification proposed by the Committee and now being voted upon for adoption pointed out the difficulties under which the Dominion Railway Board laboured in having to deal with different specifications for every Railway in the country as well as that of the Department of Railways and Canals. He trusted that in view of the fact that the Committee was a very representative one the specification would be generally adopted as the minimum standard required.

Mr. Monsarrat — Mr. Monsarrat, as chairman of Committee, stated that the principal idea of the Committee drafting the specification was that it would be generally adopted as a minimum standard.

It was very important that uniformity of practice should be secured and he had reason to believe that the Department of Railways and Canals would adopt this specification.

Mr. Sullivan — Mr. J. G. Sullivan did not consider it desirable to adopt any specification with the understanding that it could be departed from.

Mr. Duggan — Mr. G. H. Duggan said that he was entirely in accord with Mr. Sullivan. The Committee had merely put forward a specification which, although necessarily a compromise, represented the practice of the present day. There was no reason why any Railway Company should adopt it but he thought it important that the Government should do so.

Mr. Mountain — Mr. Mountain pointed out that no Railroad Company could obtain its government subsidy until its bridges were built to the minimum standard required by the Department of Railways and Canals.

Mr. Sullivan — Mr. Sullivan objected to any specification which would place a limitation on any railway company.

Mr. Duggan — Mr. Duggan pointed out that the proposed specifications were drawn up in such a way as to permit a choice as regards loading. The desire of the Committee had been to modify the best existing practice especially with a view to the revision of the Government specifications which were becoming a little antiquated. The adoption of these specifications was necessary as establishing the lowest permissible standard.

The President — The President pointed out that while the Society could not for a moment pretend to impose its standard on any railroad, it was quite necessary for the Railway Commission to adopt the most perfect specifications available for its guidance in dealing with the roads. The fact of this or any other specification would not and should not prevent the building of better bridges than the specifications called for.

The Commission had undoubted right to impose any standard they desired and the fact that these specifications were drawn up by the very

eminent engineers constituting the Committee was a guarantee of the good result which would follow the adoption of their recommendation.

Mr. Breithaupt thought that while it was very necessary that standard specifications should be issued for material of construction, it was not desirable that the hands of the consulting engineers should be tied; such a course had in his opinion a tendency to limit the progress of engineering. In his opinion, although the proposed specifications were the best that had been dealt with by Canadian engineers, there were some minor points, such for instance as "clearance" which required further consideration. The proposed length of 22 ft. 6 inches was irrationally high. Mr. Breithaupt

Mr. James White presented the report of the Committee on Conservation, and said that in drafting the report as Chairman of the Committee he had given special attention to the necessity of a better organization than at present existed for the gauging of streams. The work now being done in several provinces was briefly reviewed and attention called to the diverse organizations engaged in the work. It was obvious to any one who appreciated the value of the work that there was need for a complete reorganization in regard to it. Mr. White

The Committee had accordingly recommended that this work be concentrated in some shape or form, and that preferably some Dominion organization should undertake it.

Mr. C. H. Mitchell moved that "whereas this Society is of the opinion that it would be to the general advantage of Canada if a comprehensive system of hydrographic surveys was organized and prosecuted by some central body, with special reference to stream measurement. Be it resolved that the council of this Society be directed to initiate with the proper officers of the Dominion Government and the various provincial governments a proposal looking to the co-ordination of all stream measurement investigations which are now being carried on by the several Dominion and Provincial Government departments in various regions of the country, with the ultimate object of consolidating and continuing such investigations under some central body." He did not desire to specify how the object referred to should be arrived at, but its achievements would without any doubt reflect credit on the Society and it would be a very fruitful piece of work to the country. The work should be consolidated and placed under the control of some one department of the General Government or made a specific duty of some Commission. Mr. Mitchell

Mr. White stated that while the Conservation Commission had done some work in this connection, it had done it very much against its will and the commission would not do any work of this character which it could induce any other organization to undertake. Mr. White

Mr. Breithaupt pointed out some of the difficulties which would arise in an attempt to meet the object of the resolution, especially in consideration of the fact that the smaller streams not being navigable, were entirely under the jurisdiction of the Provincial Governments. Mr. Breithaupt

Mr. McColl — Mr. R. McColl seconded the motion proposed by Mr. Mitchell and it was carried unanimously.

Mr. Mitchell — On motion by Mr. C. H. Mitchell, it was agreed to recommend to the Committee on Conservation that the names of Mr. J. B. Challies and Mr. P. M. Sauder be added to this Committee.

The President — The President said it was a matter of regret that there was no report from the Committees on Railway Ties, Transportation Routes, Sewage Disposal, Rail Fastenings and Tie Plates, and Cement Specification. He confessed to some surprise and disappointment especially in the failure of the last named of these Committees to report.

On motion it was unanimously resolved that the Council be empowered to reappoint these Committees or appoint others in their place.

The President invited the Members present representing British Columbia to make such proposals as they had in mind in the interest of the Members of the Society in the West.

Mr. Robinson — Mr. Robinson said that there were many matters which frequently confronted the engineers of British Columbia that could best be taken care of if the large number of engineers resident in British Columbia and members of this Society could in some manner co-operate in the interests of both. It had frequently happened that the British Columbia Branches representing the Society, had to appeal to the Provincial Government on matters which should properly have come direct from the Canadian Society of Civil Engineers. But, unfortunately, matters moved so quickly in the West that they had not time to institute proper proceedings by appealing to headquarters for action from the Council and returning answers to the British Columbia engineers, before matters had gone so far as to make it impossible to apply any remedy.

The engineers of British Columbia would like to have authority to assemble and transact such business as required immediate action. They do not desire to separate from the Society, and they do not even wish to take any powers of government from the main Society, but they would like it made possible for them to be a unit recognized by the Provincial Government.

Mr. Robinson had not framed the exact words of a resolution to carry this into effect as he thought that could safely be left in the hands of some impartial person to do. This resolution should permit the British Columbia engineers to co-operate for the protection and advancement of the profession which they represented.

The President — The President remarked that it was not very clear what was desired: "Was it that all British Columbia be formed into a separate branch?"

Mr. Robinson — Mr. Robinson: "A branch, including the branches now established and hereafter to be established."

The President — The President: "Then the branches in British Columbia would in effect become branches of the British Columbia branch of the Society."

Mr. Robinson — Mr. Robinson: "Quite so. I asked the Secretary yesterday for some figures regarding the statistics of our membership. He tells me that

enrolled in all the various branches we have 900 members, students and associates. Our total membership is over three thousand. You can see clearly therefore that branches as such, with restricted area around the nucleus where they are formed, would have very little effect when appealing to the Local Government. For instance, in British Columbia. a province probably greater in extent than any other province of Canada, we have only two branches, Vancouver and Victoria. They naturally would represent a very small proportion of all the engineering fraternity in British Columbia."

The President: " Would the main Society be called upon to support that large branch as well as the branches of the branch; or if the Society supported the main branch would the smaller branches be supposed to look after themselves, or how would it be financed ?" The President

Mr. Robinson: "It would be practically automatic in its financial arrangement. Probably, the relation of the Society to its branches would correspond with the Geographical Division, and thus we might have a British Columbia Section. This is not an attempt to extort from the Society more than is due, or more than we are getting even now, but we feel that we can make the position of engineers much stronger by co-operation, by bringing in those who are now not allied to any branch." Mr. Robinson

Dr. Herdt: " Would not the proper way to meet the wishes of the British Columbia engineers be to have a committee appointed that will get from the Provincial Legislature an Act to make compulsory membership in the Canadian Society apply to the Province of British Columbia ? That would settle the question as far as the British Columbia engineers are concerned. Perhaps this could be done by the engineers concerned in British Columbia acting together, or it might have to be done by the Council. It seems to me the proper way would be to get legislation to cover the point. I thoroughly sympathize with the object of the demand of the British Columbia engineers. The appointment of outside engineers to do government work in Canada that could be done by our own engineers is getting to be a serious trouble." Dr. Herdt

Mr. Robinson: "We would like especially to avoid that attitude at present, for this reason. It has been tried in other Provinces and found to be a futile effort. A close corporation at the outset is not feasible. We cannot hope to secure that in one fell stroke, but we do hope if we can be recognized as a British Columbia section of the Canadian Society of Civil Engineers, that in a year or two legislation will become a matter of course." Mr. Robinson

Mr. Vaughan: "As I see it there is nothing under the constitution to prevent you doing that now. You could get every engineer in British Columbia to join the Vancouver branch." Mr. Vaughan

Mr. Dodwell: "Mr. President I share with you a certain misunderstanding with regard to the exact position of affairs in British Columbia. It seems to me that the difficulties under which they suffer are removable by their own action. If every engineer in British Columbia were to join Mr. Dodwell

the Victoria or the Vancouver branch of the Society our friends there would have all the powers that could be conferred upon them through any other arrangement by the Society as a body. We do not have to go as far as British Columbia to find employment of alien engineers to the loss and disadvantage of our own Canadian engineers. I think it is a question which should seriously engage the attention of the Council and if there is any way in which the Council or the Society can advance the views of the engineers of British Columbia in regard to this matter I decidedly think it should be done. But it seems to me that if every engineer in British Columbia were first of all to join the Society and then later a British Columbia branch, they could then make such representations to the Provincial Government of British Columbia as would remedy the present state of affairs, and I have no doubt but that the Council of the Society would in every possible way support such action in the direction that they might take. I have not understood from Mr. Robinson whether the eighty engineers who assembled in Vancouver in December are all members of the British Columbia branches."

Mr. Robinson

Mr. Robinson: "Yes."

Mr. Brayley

Mr. Brayley: "I would like to suggest that a by-law be brought in which would affect all branches, allowing them to take in any members who voluntarily cared to join that branch within a certain district, so they would not conflict with another branch, and that such members be charged the fees for resident members of branches, the main society to get the benefit of the increased fees as well as the branch in that vicinity."

Mr. Legrand

Mr. Legrand: "Has not any member the right to belong to a branch even if he is 100 or 200 miles from the centre of the branch?"

The Secretary

The Secretary: "He has a right to belong to the branch, but under our by-laws the Society could not exact any more than the dues of a non-resident and would not be under obligation to pay any portion of these dues to the branch."

Mr. Legrand

Mr. Legrand: "A member living in Winnipeg might move 250 miles from Winnipeg, but still belong to the branch at Winnipeg. He may be able to come once a month to Winnipeg. Certainly that member is still really a member of the Winnipeg branch, and the Society should refund such part of the fees belonging to that member."

The Secretary

The Secretary: "The Society does so when the members address at the date of the Annual meeting is "Winnipeg," not otherwise."

Mr. Legrand

Mr. Legrand: "In this case all the member has to do is simply to give his address to the branch."

Mr. McNab

Mr. McNab: "I would like to ask whether or not the object of this memorial to the Society is that the several branches in British Columbia wish to be amalgamated in order to clothe them with a little more influence in addressing municipal bodies and governments, looking to the exclusion or regulation of the employment of alien engineers? Is that the underlying principle?"

Mr. Robinson

Mr. Robinson: "Yes."

Mr. Currie: "It seems to me that this is a question which needs to be dealt with very carefully. I am not sure that this state of affairs does not exist in other provinces. It is a question that the Council as a whole should take up and make representations to the various Provincial Governments." Mr. Currie

Mr. Robinson: "Our object is not to strenuously put forth our case to the Provincial Government: that is, we do not wish to go beyond our conservative judgment. We intend, as soon as you give us permission to assemble under the name of "The British Columbia Section of the Canadian Society of Civil Engineers" to apply to the British Columbia Government for a charter organizing us as that section. In other words, to establish this section as an entity in the Province, that is all." Mr. Robinson

The President: "This is a very important question, because if we grant this to British Columbia, then we shall have Alberta, Saskatchewan, Manitoba and all the other Provinces applying in the same manner." The President

Mr. White: "It seems to me, Mr. President, that this is bringing in an undesirable element of provincialism and sectarianism. It is the thin edge of the wedge, and the only result of permitting it would be to have a British Columbia Society of Civil Engineers, or a Western Canada Society of Civil Engineers. If anyone were to come here and propose that such a section should be established to take in all west of the Great Lakes, I do not think you would consider it. In my opinion this provincial proposition has no better standing. Mr. Robinson stated yesterday that there were a very large number of engineers in British Columbia not members of the Canadian Society, and it seems to me the solution of the difficulty is to get these men into the Society. Anyone who studies the history of Canada since Confederation must come to the conclusion that the greatest mistake the Fathers of Confederation made was to give so much power to the Provinces. I am sorry to hear provincialism introduced into the Canadian Society of Civil Engineers." Mr. White

Mr. Robinson: "In answer to the last speaker's remarks, I would say you can curtail the proposed powers as far as you wish. We do not ask that the powers granted to such a geographical section should be any more than what this body is willing to give. All we ask is to become an entity." Mr. Robinson

Mr. Irving: "What is the object of their incorporating in British Columbia? That is the only objection I can see to their proposition. Why cannot they be guided by the rules and regulations under which the Canadian Society of Civil Engineers was established? Why do they want a separate charter?" Mr. Irving

Mr. Robinson: "My reason for that, Mr. President, is this. The British Columbia Government could not give a charter to the Canadian Society of Civil Engineers. They could give a charter to that part of the Society which resides within the limits." Mr. Robinson

Mr. Irving: "What do you want the charter for?" Mr. Irving

Mr. Robinson

Mr. Robinson: "The reason we wish that charter is for progressive restriction carried on in a diplomatic manner, which will hurt no one, and which will eventually tend to all intents and purposes towards a close corporation of engineers: but we do not feel that it is feasible or advisable to set out with that as a standard. We must commence in a small way, with the thin edge of the wedge, and drive hard later."

Mr. McNab

Mr. McNab: "I understand the membership of this Society is open to the world. I think our ranks are composed of a great many foreigners, and I do not see how Mr. Robinson's idea is going to overcome the difficulty, because if any alien engineers want to practice in British Columbia they would still be able to do so by becoming members of this Society."

The President

The President: "This question seems to me to present many difficulties. An incorporated portion of a society within that incorporated society, one part being incorporated under the Dominion and the others under the Province presents so many legal difficulties, that it does not seem to me practicable. I must admit that my knowledge of the law is not very extensive, but it seems to me it would require extensive amendments to the by-laws of the Society. There is no possibility of this meeting authorizing such changes. It has not the legal power to do so. It may be desirable to appoint a committee to act with the Council in thoroughly threshing out the problem, and the legal possibilites should first be ascertained."

Mr. Robinson

Mr. Robinson: "Could not a by-law be put through at the mid-year Convention?"

The President

The President: "As it is getting late we should adjourn the discussion until to-morrow. It is very important and would be a great departure for this Society. It is a matter to which we must give the most serious consideration before we can act. We must do so in the interests of the whole society as well as in the interests of the British Columbia members. There must be a thorough study of the subject by some efficient committee on which the British Columbia members should have representation."

Mr. MacNab

Mr. MacNab: "In order to crystallize this matter, would it not be well for Mr. Robinson to introduce a formal motion to-morrow under the head of new business, and have that committed to the council to analyze and study?"

The President

The President: "Yes, that would be a desirable course. The meeting now stands adjourned to 10 o'clock to-morrow morning.

Wednesday, January 29th.

A Members' Dinner was held at the Ritz-Carlton Hotel at 8 p.m. and was attended by some 200 Members and guests.

Montreal, Thursday, January 30th, 1913

Morning Session

The President, Mr. W. F. Tye, in the chair.

The meeting being called to order, the President stated that the discussion on the proposed British Columbia Branch would be resumed.

Mr. Robinson then moved, seconded by Mr. Legrand: Mr. Robinson

"That the Council be instructed to take the matter of establishing a British Columbia Branch under consideration with a view to proposing any amendment to the by-laws and taking any other action which may be necessary for this purpose."

Mr. Robinson hoped that whatever action might be taken it would be such as would increase the strength of the Society and its branches. Some of the members with whom he had discussed the matter considered it unnecessary to seek incorporation from the Provincial Government as it would only be necessary to register the Society, which has a Federal charter, as an extra provincial organization doing business in British Columbia. It would appear that such action would accomplish the object desired as well as to secure an independent charter. It would be advisable that this meeting should give the council the necessary authority to take action before the end of the year.

Mr. Jamieson asked if the Quebec Act was in form of a charter or otherwise. Mr. Jamieson

The President: "It is an Act concerning Civil Engineers. 61 Victoria, Chapter 32." The President

Mr. Mountain: "What about the Manitoba Act, is that different?" Mr. Mountain

The Secretary: "It is also an Act of the Provincial Government." The Secretary

Mr. McNab inquired if the motion had in view the exclusion of alien engineers employed on provincial works whether they were members of this Society or not. Mr. MacNab

The President: "No. The whole question now, Mr. McNab, is in regards to the establishment of a separate British Columbia Branch. That is all that is under consideration." The President

Mr. McNab: "But in connection with this it was stated last night what its objects were, and I want to know, if that is one of the features." Mr. MacNab

The President: "The whole question, as I understand it, which has brought up this request for a British Columbia Branch was the employment of alien engineers on Government work." The President

Mr. McNab: "Does that include aliens who are corporate members of this Society?" Mr. MacNab

Mr. Robinson: "Mr. Chairman, I submit that that question is too large for us to discuss at this time. It seems to me that we ought to move cautiously even in that direction; that whatever move we take in that regard should spread over a period of one or two years so as to give it thorough investigation. I do not think we should exclude members of this Society coming from any part of the world. Mr. Robinson

"We would like to promote the interests of engineers who are residents in Canada without making it a detriment to the members of this Society living abroad."

Mr. Brayley

Mr. Brayley: "I would suggest the Council look into the question also of strengthening the branches throughout the country without hurting the central organization. I have in view the fact that Edmonton has a separate engineering Society made up largely of our own members, and Regina has formed one this season. It would be better for the Society as a whole if we had branches in all the large cities of the Dominion."

The President

The President: "Of course, when the Council considers this matter it will have to go very thoroughly into the whole question of branches. If British Columbia gets a separate branch, it will be only a question of time when the other Provinces will ask for similar treatment."

The motion as proposed by Mr. Robinson was then put to the meeting and carried unanimously.

Mr. Robinson

Mr. Robinson called the attention of the meeting to the desirability of completely eliminating the question of Political patronage from engineering appointments.

Mr. Mountain

Mr. Mountain was of the opinion that patronage did not constitute a factor in government appointments to any such extent as it formerly did. The important point was to strengthen the Society so that it might be referred to in regard to all important engineering positions.

The President

The President: "I think there is no doubt that this Society is growing in strength and in dignity with the outside people. It may not be growing in that respect as fast as we should like, but the growth is substantial and good, and all we have to do is to conduct our affairs and our work in a proper manner, and our Society will grow and eventually be recognized as the commanding body of engineering skill in this country. I have noticed during my own professional life a tremendous difference in the attitude of the layman and the employer. In my younger days when a man was applying for a position it was very unsafe for him to say that he had had a college education. The idea then was that an engineer was always a practical man, and if you were not a practical man you were no good. Now among the railroads they are encouraging improvements in the educational standard, they are giving bonuses, prizes and so on for engineering education: they are taking the young men from college and putting them on work during vacation, and they are doing everything they can to advance the status of the profession. So there is, in that respect, a tremendous advance, and that advance will go on. It is like a snowball rolling down hill, it increases in speed and size very rapidly once it gets a good start."

Mr. Mountain

Mr. Mountain: "The movement for the betterment of the Government Engineering Service, with which you are probably very familiar, is a matter which we have been taking up with the cabinet. You remember, Sir, you were on a delegation to the Premier on the question, and the Minister of Militia and Defence went into it very thoroughly last night

at the banquet. I did not know he was familiar with it. As one of the chief engineers of the Government I am in touch with the matter, and we are getting along very nicely with it. Now, this Society is recognized in connection with that, and we have no doubt whatever that we are going to get that bill through. If the Dominion passes such an act then every Province will be influenced by its example."

The President: "Yes. Colonel Hughes was very frank in referring to the proposed legislation regarding a Government Engineering Corps. In his mind there is no question that a strong body of engineers will shortly be developed." The President

Mr. Mountain: "You are representing the Society, Mr. President, and you are liable to be called upon to come back at any time and reaffirm your views, as you are familiar with the case." Mr. Mountain

Mr. Robinson moved that the meeting heartily endorse the action of the Council in promoting an Act before the Dominion Government for improvement in regard to the organization and status of the Engineers in public service. Mr. Robinson

The resolution was seconded by Mr. Jamieson and carried unanimously.

Mr. Elmont moved that a Committee be appointed to prepare standard specifications for reinforced concrete structures. He urged that such construction was now largely used in Canada and that years ago it had been deemed advisable in most European countries and in the United States to issue standard specifications covering the work. It would be of great benefit to the country if the matter were taken up by the Society. On motion by Mr. Mountain, seconded by Mr. Robinson, the matter was referred to the incoming Council for consideration and action if deemed desirable. Mr. Elmont

Mr. Brayley asked for some action in regard to obtaining uniform by-laws for the branches and for special lists of the members of each branch. Mr. Brayley

The President stated that some of the branches had objected to a uniform set of by-laws, and that in regard to separate membership lists for the branches the proposal was not practicable because of the fact that a large number of the members changed their addresses several times during the year. The President

Mr. Legrand concurred in the view that uniform by-laws were not desirable. Mr. Legrand

Mr. Robinson stated that in Vancouver they were engaged in preparing by-laws which they had some hope would be found suitable to the other branches. Mr. Robinson

Mr. Jas. Kennedy thought that a useful purpose might be served by using some special mark to indicate those who belonged to a branch. Mr. James Kennedy

It was pointed out that an address as given in the list of members was in itself an indication of the branch to which a member belonged.

Mr. John Kennedy spoke as follows regarding the work of the Transportation Route Committee. "You will all remember that on the for- Mr. John Kennedy

mation of the General Committee on Transportation, it was sub-divided into committees, of which several have been mentioned, and amongst others was one on transportation routes. This latter was some two years years ago in Winnipeg constituted an independent committee.

Now the Transportation Committee as a whole has really done almost nothing. The first Chairman was Mr. McNab, who resigned after a time, then Mr. Mountain followed, and yourself, Mr. President came next, and then I was appointed some time ago. The subject seemed to me to be tremendously large when I sat down to consider it and try to do something about it. You yourself, Mr. Tye, have written an important paper on four transportation routes between Fort William and Montreal, and Mr. Jamieson has also done a good deal personally in the same way. Mr. Coutlee has also done something, but as a committee we have not been able to meet and do much.

Looking over the subject as it stands, transportation routes take in everything from Hudson Straits down to Lake Erie and from Cape Breton to Vancouver Island, and that would be connected again on the Pacific side with the Panama Canal and Liverpool, and the same on this side. Then there is railway transportation as well as water transportation. It comes to be a tremendous subject unless it is more particularly defined than it is now.

Although we got permission from the Council to engage an expert, yet, I confess, I hardly see how the Committee as a volunteer Committee can make a report which will be worthy of the Society and have any weight. And after we have done it what would it accomplish further than giving us personally some useful information. It could not be expected to have any influence to any extent on the policy of the country, and certainly no railway company would pay the least attention to it.

I have grave doubts as to the usefulness of continuing the committee, and if it is continued possibly its scope could be carefully revised and concentrated somewhat. I am not prepared to make a definite recommendation in the matter, but I put the case before the meeting so that it may be considered."

Mr. Jamieson

Mr. Jamieson: "Mr. President, as a member of that Committee on Transportation, I must confess to a great deal of disappointment that we did not succeed in accomplishing what we set out to do. It was a very difficult matter to deal with, and we have had a great many changes of chairmen, and some members no doubt have not been able to give the time and attention to it that was expected. I know that our President, who was Chairman of that Committee devoted a lot of time to it and got out quite an extensive report especially on the railway portion of it. I have myself devoted a large amount of time and have been at some expense in connection with the work. Although I have collected and arranged some valuable data, we, to-day, have practically, as a committee, produced nothing. It is a very big and difficult subject to deal with, and one which unless gone into in minute detail had better not be undertaken."

Mr. Mountain concurred in the view that the subject was a most complex and difficult one, and he had, from his experience on the committee, been forced to the conclusion that valuable results could not be expected from it. Mr. Mountain

The President: "As Chairman for a period of that Committee, I gave some time to it, and I came to the conclusion that the subject was not one which this Society could very well deal with. It is too big for any voluntary committee to handle. It should be dealt with by the Government through a permanent Commission. Not only the question of operating cost, but a lot of construction costs have to be taken into consideration, which it is fairly difficult for any voluntary committee to obtain, and of course the question of proper transportation routes depends on cost as well as other matters. I really do not see how this Society could possibly get up a report which they would wish to see go out as the views of the Society. The President

"I got up a paper on the subject, but I would not like it to go out as a permanent expression of my opinion, or to assert that the information in it was accurate. It was written with the idea that if it was distributed among the different members of the committee they would criticise it, as I am sure there must be many inaccuracies in it. Unfortunately this paper has got into other hands and some use is being made of it.

"I think the best thing this Society could do, would be to recommend to the Government that they appoint a permanent paid commission to devote their time to that subject, and that subject only, as it is big enough and important enough to engross the time of a number of engineers for several years. The problem is one of economics, and at the present time no one knows what set of routes will give the best value to Canada."

Mr. Jamieson: "Mr. President, my idea was probably different from that of many others of the committee. I did not propose to deal with the routes in the way of making any recommendation, but to work out each one on an economic basis and then let the result speak for itself." Mr. Jamieson.

The President: "That is the only way it can be done, Mr. Jamieson, but I would suggest that after going to all that trouble, you should write a paper for the Society. The President

Mr. McNab pointed out that the Comptroller of Statistics had stated in the report of the Department of Railways and Canals for last year that it was important at the present time to analyze the relative cost of transportation by water and by rail, and he did not see how members of the committee could be expected to arrive at any satisfactory result. Mr. MacNab

Mr. McColl thought that greater caution should be exercised by the Society in appointing committees and stated that he was opposed to the practice of preparing standard specifications giving details. He did not think it desirable to ask the Government to appoint a Commission to consider the reports on transportation. Mr. McColl

Mr. Mountain

Mr. Mountain: "I move, sir, that the Committee on Transportation Routes be disbanded. I do so with a great deal of regret, because, as all the members of that committee know, we added representatives of different shipping companies. I think the Allans were requested to co-operate with us, and they agreed to do so. I think it was a Committee hurriedly formed, and I regret that it was ever brought into existence."

Mr. Skaife

Mr. Skaife: " I second Mr. Mountain's motion and I would couple with it this proviso, that the committee by its Chairman be asked to put in writing in the form of a paper or a report such information or opinions as they have reached before the committee is dissolved."

Mr. Kennedy

Mr. Kennedy: Possibly it would meet the case if the motion were slightly changed so that the matter of the continuation of the Committee be left to the Council. It must be remembered that the papers that have been handed in are not the report of the Council but papers by individual members, and the Committee has really no jurisdiction over them.

The President

The President: "It is certainly not possible for this Committee to give us even a progress report."

Mr. Legrand

Mr. Legrand: "At the same time it would be a great pity to have the data already prepared lost to the members of the Society. If individual papers could be got up by the members of the Committee it would certainly be a great addition to our transactions."

The President

The President thought if the members who had worked on it would present their information in the shape of a paper it would be a valuable addition to the transactions. If they so desired they could say the paper was presented more for discussion than as their definite findings.

The motion to discontinue the Committee was then carried.

Mr. Jamieson

Mr. Jamieson as Chairman of the Committee on Portland Cement and Concrete regretted that the Committee had not been able to present a report at this meeting. A large amount of data had been accumulated especially in regard to the action of seawater on concrete, but time had not been available for its formulation.

Mr. Duggan

Mr. Duggan as Chairman of the Committee on papers spoke as follows regarding the difficulties of securing suitable papers to put before this membership. "It seems to me the value of the Society to outside members is largely gauged by the class of papers put before it. Although some of the papers we receive are excellent they are very few in number. On the other hand, we see by the reports of the various branches that a number of very interesting subjects are treated and occasionally we get a paper forwarded by the branches. I am afraid the tendency is for a man to appear before a branch and give an interesting talk illustrated with lantern slides, but not to get down to the hard work of writing a paper. After the address has been discussed he promises to put it in the shape of a paper to come before the Society, but it never materializes. I only noted one instance last year where a paper came to the Society after it had been read at a branch. From the writer's point of view, if he presents his paper to the branch first, then sends it to the Society to be published, it has

lost half its value, because no discussion goes with it. I think every writer of a paper values the criticism of his brother engineers. In fact, where the paper is read first and the tranactions published afterwards the discussion is very often just as valuable as the paper itself.

There is another thought that has just come to me from the discussion regarding specifications. The making of Committees to discuss them seems to me to detract from our papers. For example, the American Society has had bridge specifications put before it at the rate of one or two a year followed by excellent discussion; with our Society we have none. I think the appointment of Committees to write up standard specifications should be very carefully considered. It is detracting very much from the transactions, and is one of the reasons why they are not improving.

Mr. Jamieson said: "One difficulty with our papers is that we do not get them in time to enable members to go over them before the meeting and be prepared to discuss them. There is consequently a lack of proper discussion, and it is a matter of disappointment to a person who has spent a lot of time on a paper to find the discussion is not what it ought to be. I think the time has come when we ought to insist that every paper should be sent in printed and distributed within a certain definite date previous to being presented to this Society. In that way there could be no excuse for members conversant with the particular subject not being prepared with a good discussion, and also written discussion from members at a distance could be put before the meeting. Then we should have papers of more value and more valuable discussion." Mr. Jamieson

Mr. Duggan: "The reason for that, Mr. Chairman, has been that in a great many instances we have not had papers in time and it becomes a matter of hurrying and being glad to have a paper of any kind. That is why I bring the subject up. We ought to have a lot of good papers ahead of us." Mr. Duggan

The President: "Mr. Duggan says that these Committees take away from the number of papers, but such a specification as that on bridges is certainly more valuable than any papers could well be." The President

Mr. Duggan: "I would like to say a word about that, having worked on it. The specification went out to the branches to be considered by the members, and we had, I suppose, one or two hundred pages of discussion that was not printed and was therefore lost to members generally." Mr. Duggan

Mr. Lordly thought that young members were deterred from writing papers by the idea that they might be harshly criticised. Mr. Lordly

Mr. Legrand: "They should be good sports. Regarding the bridge specification, I may say that we had two special meetings of the Manitoba branch and I think we broke the record. We finished at about one o'clock in the morning. We had a fine discussion." Mr. Legrand

The President: "I see no reason why the bridge specification should not be treated as a paper and discussion printed in connection with it. As I understand, it was supposed to be discussed at the different branches, and therefore it was a paper that was not only discussed at headquarters The President

but by all the branches. I am still of the opinion that a report of this kind from such a Committee is a work of permanent value as, I believe, no paper could very well be."

Mr. Duggan

Mr. Duggan: "Would it not have been much better and have lightened the labors of the Committee if that specification had first been written, then discussed by the members and a Committee struck to make a standard specification as the result of that discussion. I believe that would be the proper course to pursue in connection with the proposed specifications for reinforced concrete, and a year hence a Committee having the paper and the discussion before them might formulate something of value and the transactions be vastly improved by the papers, and the discussion."

The President

The President: "Why not have the Committee struck and let them present what might be called a preliminary report, which should be read as a paper and sent to the different branches for discussion? That was supposed to be done in connection with the bridge specification."

Mr. Legrand

Mr. Legrand: "Mr. President, would it not be advisable for the Council to get in touch with a member who is thoroughly conversant, for instance, with reinforced concrete, and try to get from him his specification, and treat it as a paper and have it discussed by the members, but take plenty of time for discussion? Don't force it before the next meeting, take a year, and send the specification to the different branches for thorough consideration. Then I think, you will get some pretty good results."

The President

The President: "That of course would be very satisfactory."

Mr. Vaughan

Mr. Vaughan: "Mr. President, a good deal of this leads up to what I was saying yesterday in connection with the appointment of the Committee by the Council. It may not appear exactly connected, but what made me get up and speak yesterday was my experience in the American Master Mechanics and Master Car Builders Association of the way in which they handle their committees and reports. The Master Car Builders Association, starting with a few men who are running the Car Departments of small roads, has by the excellence of its committees' reports and the able way in which the Society has been run, taken the place of a railway clearing house in connection with car interchange in this country.

The first thing their Council does after the annual meeting is to meet for the consideration of their year's work. They do not take any instructions from the annual meeting. Matters are referred to the Council for decision from the annual meeting with recommendations which are practically always observed. Then they select their committees and their papers. If the subject under consideration is not good for committee work they select somebody and have him write a paper on it.

They are doing some other things which we do, but are dealing with them more systematically than has been possible in this Society. Railway clubs all over the country are utilized for the discussion. The rules of car interchange for example are considered as a paper one evening and

discussed. We are trying to do this in sending out bridge specifications, but it should be treated in the same way, and then the whole thing would be on file. If all the small railway clubs in the country can afford to do that, a large Society like this ought to be able to.

I do feel it is a mistake to appoint committees and try to decide a whole year's business at an annual meeting. I think it would be much better to leave it to the Council to appoint representative committees, and let it look after those committees and see that they have their reports in readiness for the annual meeting or send them to the branches for criticism in order to get the final reports in. It is necessary to leave matters to the Council if they are to be properly carried out."

Mr. Jamieson

Mr. Jamieson: "Mr. Vaughan's remarks are very much to the point, but I think the comparison is hardly a fair one. The Master Car Builders Association is composed of men all connected particularly with car building and car movement, and therefore they could deal with that a little better. We do not to any extent select the members of our Council from any particular branch of the profession. We have so many specialities that our Committees may not always be composed of men best able to deal with them."

Mr. Duggan

Mr. Duggan: "We did not get any expression from the branches as to the course of these papers. Merely as a suggestion, I would say that when an important paper comes up before a branch it ought to be sent down here to be printed first, that is if it passes the Committee on Papers, and then be sent out to the membership at large, so that it may go into the transactions eventually."

Mr. Legrand

Mr. Legrand: "The trouble, Mr. President, about a paper being first sent to the parent Society is that we like to have our meeting as interesting as possible, and you know how much time a paper takes to prepare. Sometimes we are asked to write a paper for our next meeting. What I am going to try and do this year in Winnipeg is to have a stenographer report the whole discussion, and if the subject is interesting enough we will send not only the paper but also the discussion in for printing. Your Committee on papers could select some of the discussion if it is to be printed and add it to the paper."

Mr. Harkom

Mr. Harkom expressed his opinion that the difficulty as it presented itself to the members generally was one of organization. He suggested that the formation of a Montreal Branch for the conduct of local business and the reading of papers would relieve the Council from a lot of routine work and enable it to confine its attention to the general affairs of the Society.

Mr. Vaughan

Mr. Vaughan: "I would like to call Mr. Harkom's attention to the fact that last year we had such an organization. We appointed a Committee on Papers and a Committee on Meetings at the headquarters of the Society to relieve the Council of this work, and it is being continued in just the way Mr. Harkom outlines.

We have discovered the trouble of this Society. It all comes down to the inefficiency of the Council and the poverty of the branches. Last night we were told by our guest of honor how easy it was to become rich if we would only follow in the footsteps of our President. Now, if you changed round, turned the Council into the Society and the Society into the Council everything would run beautifully. I must say I always thought a member who did not reside within the limits of a branch could join that branch and the branch get the benefit of his rebate if it desired. Now we have changed the branch limit to a twenty-five mile radius instead of fifty, I think we should bring in a by-law next year, which is the earliest we can possibly do, to remedy that state of affairs. I therefore move that the Council be requested to submit such amendments to the by-laws as will permit members residing within such distance from a branch as may be agreed on to join it. That will enable us to discuss the question and provide a remedy."

Mr. McColl

Mr. McColl: "I think this an opportune time to bring up the question of by-laws. The present condition in regard to branches is rather unsatisfactory. The organization of the engineering profession must eventually come down to the question of jurisdiction of either districts, or provinces, or the parent Society here. That is necessary from the fact that we shall have to come down to provincial matters for the reason that the provinces deal with legislation in connection with provincial matters. I would move an amendment to Mr. Vaughan's motion that it is the opinion of the meeting that the Council should consider the whole question of branches or of provincial societies, and bring forward recommendations, which would enable us to consider the problem at the next annual meeting; or that a Committee be appointed to report on the matter."

The President

The President: "That question has already been referred to the Council on the request of the British Columbia members."

Mr. Duggan

Mr. Duggan: "I will second Mr. Vaughan's motion."

Mr. Brayley

Mr. Brayley: "Will that recommendation to the Council include the change of the present by-law to two-thirds of the votes cast instead of two-thirds of all the members of a branch in order to increase the dues?"

Mr. Legrand

Mr. Legrand: "I suggest that the Council send a circular letter to the branches inviting them to send suggestions respecting a change in by-laws early in the year, say in March. Then the Council will discuss it and say what they consider to be reasonable in an amendment to By-laws."

The President

The President: "Yes, I understand so, and I think the Council should undoubtedly take the question up with the branches so as to get their ideas of the limits which each should cover."

Mr. Vaughan

Mr. Vaughan: "Mr. Duggan has made a good suggestion to me. It is that we should have a meeting in September of the councillors representing all portions of the Dominion to consider these by-laws, and that the Society should pay their travelling expenses to and from Montreal."

Mr. Legrand: "That would be too late. The branches should consider the matter and send in their report by March or April, so that it would be discussed before the members of the council." Mr. Legrand

The President: "I think the council can be trusted to convene such a meeting as soon as possible on the instructions of this meeting. The President

The President: "We have a report by wire from the different members of the Gzowski Medal Committee. The Chairman of that Committee is away ill, so that they had to get the views of the different members by wire. They are unanimous in recommending that Mr. R. F. Uniacke be given the Gzowski medal for his paper on "The Little Salmon River Viaduct." Is it your pleasure that this report be confirmed ? Carried. The President

The next business is the report of Scrutineers.

The Secretary read the report of Scrutineers on the ballot for specifications which declared that all the specifications submitted had been adopted viz:—

a. Steel Railway Bridges—Fixed Spans.
b. Roadbed and Ballasting.
c. Stone and Gravel Roadways.

The President: "Does this meeting instruct the Council that these specifications be printed and distributed ? Carried. The President

The Scrutineers for the Ballot on Amendment reported that By-laws Nos. 20, 23, 24, 51 and 55 as amended had been carried by the necessary majority.

The Secretary read the report on the Ballot for Election of Officers and members of Council announcing the election of the following:—

As President—Phelps Johnson.
As Vice-President—F. C. Gamble.
As Councillors—
District No. 1—J. M. R. Fairbairn.
W. J. Francis.
R. J. Durley.
District No. 2— F. A. Bowman.
District No. 3— W. D. Baillairge.
District No. 4— S. J. Chapleau.
District No. 5— H. E. T. Haultain.
District No. 6— W. A. Duff.
District No. 7— T. H. White.

The President then declared the foregoing gentlemen elected, and requested Mr. Johnson to take the chair. The President

Mr. Johnson was received with applause and on taking the chair thanked those present for their reception of the announcement of his election. Mr. Johnson

Mr. Harkom in continuation of some remarks which he had made at an earlier stage of the meeting moved that the Council be requested to consider the advisability of forming a Montreal branch to operate on the same lines as other branches already formed. Mr. Harkom

Mr. Crumpton

Mr. A. Crumpton seconded the motion and in doing so urged that some such movement must be made in order to give the younger members the opportunity they desired to take an interest and obtain benefit from their connection with the Society. The local branches elsewhere had achieved this result and it was necessary to follow the example set by forming a branch for Montreal. As matters now stood the younger members were diffident about taking part in discussion in the presence of the older members.

Mr. Vaughan

Mr. H. H. Vaughan spoke as follows:–"I would ask what is meant by that motion in the form in which it is put. The Society in Montreal is carrying on a monthly meeting, which is as far as possible a general meeting of the Society, but in addition to that there are held sectional meetings, the mechanical section, the general section, the electrical section, and the mining section, which to all intents and purposes are meetings of a Montreal branch. What more could you suggest ?

"As for anybody being afraid to come up and give a paper, why, if anybody will come up with a paper we will welcome him with open arms. It need not be a magnificent literary production. He can come in here and get a splendid audience of six or eight young fellows, and he need not be afraid of anybody turning him down or being cruel to him. A young man has every opportunity of reading a paper and getting it discussed by young men like myself. The trouble now is that people are not interested in discussing papers. Last year we would go after a man who did not want to read a paper and persuade him to prepare one, then we would go to work and pull out a lot of people from their comfortable homes who did not want to hear that paper, but they would come down because we telephoned them. We were thus working in a circle.

"Where I think the young men make a mistake is in this way. I am going to say this from experience in the States. The reason I got ahead in the world was because I read papers at railway clubs. There is nothing that brings a young man forward better than reading papers, if he reads good ones. Men are always looking around for a young chap who will show a little common sense and dig into facts, and when they know one who has read a good paper they keep him in mind, and ultimately they will engage him. Nothing would do the young men in this branch or any other branch more good than to take the trouble to dig into a subject in which they are specially interested and get up papers on that subject. I think you will find that there are very few young men who make themselves master of a subject who cannot do better than the older men, because the latter are doing too much general work. So I do not think there is any need to be afraid. What we require to-day is men with the energy to write papers. I say there is every opportunity in the Montreal headquarters for any of that work to be done. We might go a little further in the social line, but some of the branches have the advantage of engineers' clubs which of course helps. There is nothing to prevent any of the branches affiliating with other societies. We cannot do that here. We tried to get together

with the Engineers' Club, but it was not practicable. We might get an Entertainment Committee and organize smoking concerts, or something of that sort."

Mr. Irving said that Mr. Vaughan had expressed exactly the trouble that they were having in Toronto to get young men to write papers. There is a lot of interesting work going on which would give them splendid material for papers, but they keep away. Mr. Irving

Mr. P. J. Duff said: "It seems to me that what is necessary to educate the young men to bring papers of an intellectual nature before the Society is to form a students' section where they alone would meet and discuss their own papers. That provides a sort of preliminary training for bringing papers before the Society. Speaking as an old graduate of the Institute of Mechanical Engineers of London, where I had an interesting experience, the young members of that Society were brought together and many valuable papers were produced. It educated the young engineers to speak, and eventually those same engineers who read papers before the Graduate Society became the most useful members of the parent body. I think if some such Society could be established with us it would form a useful stepping stone. This junior section of the Mechanical Engineers organized periodical visits to interesting works in and around the Society's headquarters, which were most valuable." Mr. Duff

Mr. Harkom explained that the motion was put forward in the interest of the younger members who felt themselves overshadowed by the older members. It was his desire to help in the training of the younger men to take the place of the older as they advanced in life. Mr. Harkom

Mr. John Kennedy spoke as follows:—"I would not like to add anything to what Mr. Vaughan has said, but just to emphasize and support it. I notice that this resolution was put forward by gentlemen who were not members residing in Montreal, and not members of any other branch, and have had no real experience in this matter. I think it would tend to worse confusion if we were to try to make a Montreal branch. We possibly have a wrong idea about this matter of papers which seems to be behind the motion. We must remember that at the present time the whole country is flooded with technical journals and that it is practically impossible for a busy engineer to do much more than to read what is published in them. All the best papers of the Engineering Societies are published in the Engineering Journals. Mr. John Kennedy

We are proposing to put upon the Council and the Committees what is really the duty of individual members. We are scolding the Council for not making papers, but it is the members who will not give any papers.

There is no use for a young man being shy. If he has anything to say let him say it. If he has not the pluck to say it, it is not worth listening to. Mr. Vaughan is quite right. The men who write papers are the men who think and have something to say, and who have evinced their intellectual ability by their papers, and employers of engineers, like other men, are continually watching for the man who has something in him, and they are

more bothered about that than the young man is in getting a higher place. During all my connection with the Society I do not remember having head a harsh word about any paper. Sometimes papers have not been published because really there was not much in them or they had merely repeated something that had been said before. The Annual Meeting is not the right place at which to order the members in Montreal to form themselves into a separate branch independently of the Council, because the thing is not workable and would really complicate matters and induce confusion.

Let those members who want to write papers write them freely and not scold those who do not write when they themselves are not setting an example."

Mr. Tye

Mr. Tye said: "I would like to go a little bit further than Mr. Vaughan did, in saying that there is now in Montreal what is to all intents and purposes a branch, only it is much more elaborate and seems to be much more effective than any branch could possibly be. As Mr. Vaughan pointed out there are meetings every month, and there are sectional meetings for the general, electrical, mechanical and mining branches and all this is carried on by an organization just as independent of the Council as the branches are. They have different officers. The President does not preside at any of those meetings. The officers, as officers of the Council, do not take part in them. If you just turn to the charter and by-laws you will find the officers of the different sections. Then there is a Committee on Meetings and a Committee on Papers. I cannot conceive what more elaborate branch you could have than that. The only thing is they do not restrict the officers or membership of this organization to men residing in Montreal. It seems to me the arrangement for local work is much more complete and effective than any ordinary branch machinery could bring to pass."

Mr. Lordly

Mr. Lordly thought that the branch organization tended towards disintegration. That a greater interest could be created by cultivating social intercourse.

Mr. Mountain

Mr. Mountain stated that the workings of the sections was a matter which had received the attention of the Council on several occasions and it was felt that good work was being done and that they aided materially in maintaining our Society as a national body of engineers.

Mr. Kennedy

Mr. Kennedy, replying to Mr. Lordly, pointed out that the aggregate attendance at the sectional meetings would be much greater than would likely occur if the different papers were presented at one general meeting.

The Secretary

The Secretary stated that the average attendance at meetings during the past year or two had been quite up to that of former years. Whenever an interesting paper was presented the lecture room was filled.

Mr. Jamieson

Mr. Jamieson remarked that every facility was given to members desiring to present papers, and there was no reason why any one should hesitate in that connection.

Mr. Legrand informed the meeting that the Manitoba Branch would this year create an electrical section and had in view the organization of a mechanical section. The members of the Branch attended the meetings whether they were interested in the papers presented or not because they felt it to be their duty to do so, and personally they had the feeling that it was a duty to themselves to take every opportunity possible of engaging in professional discussions. Mr. Legrand

Mr. S. S. Oliver remarked that the establishment of a Branch in Montreal was, to his mind, entirely a local matter and the Annual Meeting should not be called upon to take time in discussing it. Mr. Oliver

The President: "Mr. Harkom's resolution is really a reference to the Council and will receive its consideration; in connection with it the Local Junior and Student members will be consulted." The President

Mr. J. S. Armstrong moved the following resolution:—"That the Council be requested to appoint a Committee to consider and, if possible, draw up a schedule or scheme of charges for engineering services. He felt there was a necessity for some regular scale of charges which should be recognised by the members of this Society and by the public." Mr. Armstrong

Mr. Leofred seconded the motion and stated that the schedule should refer only to minimum charges. Mr. Leofred

Mr. Legrand, in discussing the motion, gave his opinion that such a tariff would not be workable in this Society. The rate chargeable by members would depend upon their professional standing. Mr. Legrand

After some discussion the motion was put to the meeting and on division was lost.

The Secretary reported that Mr. F. H. Pitcher had just telephoned him to say that he had intended to be present in order to ask that the matter of appointing a Committee to consider specifications for steel water pipes be referred to the Council. Mr. Pitcher found that he could not be present and asked that the matter be referred to the Council. This was agreed to. The Secretary

The Secretary read a statement making recommendations for the personnel of the Nominating Committee for the election of officers and members for the year 1914.

The Montreal Members of Council recommended Mr. H. M. Jaquays as the representative for District No. 1. Mr. Jaquays was unanimously elected.

The Members of Council for District No. 2, comprising the Maritime Provinces and the United States, recommended two gentlemen, Messrs. F. W. W. Doane and G. Stead. A vote being taken Mr. Doane was declared elected.

The Quebec Branch, representing District No. 3, that is, the Province of Quebec, suggested the names of Messrs. F. X. A. Leofred and R. O. Sweezy. A vote being taken Mr. Leofred was declared elected.

For District No. 4, the Ottawa Branch suggested the name of Mr. James White and the Kingston Branch that of Mr. J. A. Macphail. A vote being taken Mr. White was declared elected.

On the suggestion of the Toronto Branch, Mr. J. G. Sing was unanimously elected to represent District No. 6.

The Victoria and Vancouver Branches suggested the names of Messrs. J. H. Gray and L. G. Robinson. A vote being taken Mr. Robinson was declared elected.

The Secretary

The Secretary explained that the geographical districts would require reconsideration, in view of the increase of membership in the western part of the Dominion. The matter was referred to the Council with power to act.

On motion by Mr. Mountain, seconded by Mr. Monsarrat, it was resolved to extend the thanks of the Society for facilities in connection with the Annual Meeting to the railways of the Eastern Passenger Association, to the Montreal Tramways Company, to the Canadian Steel Foundries, Limited, and to the Canadian Pacific Railway. The motion was unanimously adopted.

On motion by Mr. Wm. MacNab, seconded by Mr. P. J. Duff, it was unanimously resolved to convey the thanks of the Society to the Dominion Conservation Commission for valuable reports presented gratuitously to the Society.

The President

The President: "If there is no other business to be brought before the Meeting, I shall declare the Meeting closed.

The Meeting was then adjourned.

The

Canadian Society of Civil Engineers

176 Mansfield Street, Montreal.

Established Feb. 24th, 1887. Incorporated by Dominion Act, June 23rd, 1887 (50 Vic., Cap. 124).

REPORT

OF

ANNUAL MEETING

1914

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The Canadian Society of Civil Engineers

REPORT OF PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL MEETING, HELD AT THE ROOMS OF THE SOCIETY, 176 MANSFIELD STREET, MONTREAL, 27TH TO 29TH JANUARY, 1914.

The President, Mr. Phelps Johnson, in the Chair.

MORNING SESSION, 27TH JANUARY, 1914.

The President called the meeting to order at 10.30 A.M.

The minutes of the last Annual Meeting, held January 28th to 30th, 1913, were read and approved.

On the nomination of the President, the following gentlemen were elected as scrutineers:—

For the Election of Officers etc.:—Messrs. James Ewing (Chairman), G. E. Fiset, R. McKillop, S. Blumenthal, J. C. Day, R. B. Stewart, H. P. Borden and B. O. Eriksen.

For Amendments to By-Laws:—M. Beullac (Chairman), E. C. Kerrigan, J. T. Fullerton, C. M. Pitts, J. S. Hall and J. Robertson.

The Report of the Council, having been distributed in advance of the meeting, was, on motion by Mr. G. A. Mountain, seconded by Mr. F. X. A. Leofred, taken as read and received.

REPORT OF COUNCIL FOR THE YEAR 1913

The Council presents the following report on the work of the Society during the past year:

Roll of the Society

The elections took place as follows:—Thirty Members, fifty-four Associate Members, one Associate, forty-five Juniors and one hundred and thirty-five Students.

Twenty-six Associate Members were transferred to the class of Member, eleven Juniors were transferred to the class of Associate Member, one hundred and twenty Students were transferred to the class of Associate Member, eighty-three Students were transferred to the class of Junior and two Students to the class of Associate.

Eighteen deaths have been reported, one Honorary Member, eleven Members, three Associate Members, one Junior and two Students. There have been removed from the rolls by resignation and on account of non-payment of dues, or on account of failure to apply for transfer to an appropriate grade: Three Members, five Associate Members, one Associate, one Junior and four hundred and thirty-seven Students.

At present the membership stands as follows:—

Hon. Members	12
Members	622
Associate Members	1,313
Associates	40
Juniors	262
Students	545
Total	2,794

The large number of Students noted above as having been removed was the outcome of the circular issued in January 1913 calling attention to the limitations of Student membership and notifying all concerned that unless application were made for transfer to a higher grade their names would be removed from the rolls.

The eighteen members who have been removed from the rolls of the Society by death are the following:—

*Hon. Member	Sir William H. White, K.C.B., F.R.S.
Members	P. Alex. Peterson (Past President)
	Peter S. Archibald (Member of Council)
	Adolphus Bonzano
	Alfred Brittain
	Richard W. Farley
	George Blinn Francis
	Albert George Macfarlane
	George McPhillips
	James Ross
	Wilfrid Theodore Skaife
	William Johnston Sproule
Associate Members	Edward Jodoin
	Lambert Lynn
	Russell D. Willson
Junior	James Melville Robertson
Students	Norman Wesley Brownell
	Harold Franklin Cole

The resignations in practically all cases have been due to the fact that the gentlemen in question have ceased to be actively engaged in engineering work.

Annual Meeting

The twenty-seventh Annual Meeting was held at 413 Dorchester Street West, Montreal, in January 1913, under the presidency of Mr. W. F. Tye.

The first session was called to order on Tuesday, January 28th, at 10.30 a.m., and the meeting was adjourned on Thursday afternoon January 30th.

Meetings

The Council has held seventeen meetings during the year. There have been two sectional meetings and seven monthly meetings of the Society.

The following papers and addresses were presented:

Monthly Meetings:

"Street and Railway Track Paving with Asphalt Block in a Suburban Town," by Mr. Frank Chappell, A.M.Can.Soc.C.E.

"Trusses without Diagonals in Reinforced Concrete," by Mr. V. J. Elmont, A.M.Can.Soc.C.E.

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* Note.—Brief obituary notices of the above will be found on pages 34 to 43.

"The Projection and Survey of the 141st Meridian Boundary Line," by Mr. D. H. Nelles, A.M.Can.Soc.C.E.

"Results of an Investigation by the Dominion Government on the Coals of Canada from an Economic Standpoint," by Dr. J. B. Porter, M.Can.Soc.C.E.

"Elevator Construction," by Mr. Jas. Spelman, M.Can.Soc.C.E.

"The Toronto Water Filtration Plant," by Mr. F. F. Longley, A.M.Can.Soc.C.E.

"The Engineering Problem of Electrification," by Mr. A. H. Armstrong, M.Am.Inst.E.E.

Electrical Section:

"Electrification of a Reversing Mill at the Algoma Steel Company," by Mr. B. T. McCormick, A.M.Can.Soc.C.E. (Joint Meeting of Electrical and Mechanical Sections.)

"The Use of Synchronous Condensers with Transmission Lines," by Mr. H. B. Dwight, A.M.Can.Soc.C.E.

Branch Societies

The several Branches of the Society, their Headquarters and Officers at this date are as follows:—

Victoria —Headquarters, 534 Broughton Street. (Address P.O. Box 1290.)
Chairman, F. C. Gamble.
Sec.-Treas., R. W. Macintyre.

Vancouver —Headquarters, 570 Granville Street.
Chairman, G. R. G. Conway.
Sec.-Treas., J. R. Grant.

Calgary —Headquarters. (Address, P.O. Box 2318.)
Chairman, H. B. Muckleston.
Sec.-Treas., P. M. Sauder.

Manitoba —Headquarters, University of Manitoba, Winnipeg.
Chairman, E. E. Brydone-Jack.
Sec.-Treas., G. E. Bell, Box 2918.

Toronto —Headquarters, Engineers' Club, King St. West.
Chairman, E. A. James.
Sec.-Treas., A. B. Garrow.

Kingston —Headquarters, School of Mines.
Chairman, A. K. Kirkpatrick.
Sec.-Treas., L. W. Gill.

Ottawa —Headquarters, 177 Sparks Street.
Chairman, G. A. Mountain.
Sec.-Treas., A. B. Lambe.

Quebec —Headquarters, City Hall.
Chairman, A. R. Decary.
Sec.-Treas., A. Amos.

Committees

The following have been the Committees of Council during the year:—

Library and House Committee:

F. P. Shearwood, Chairman.
R. J. Durley.
J. M. Robertson.
H. R. Safford.
A. Stansfield.

Finance Committee:

C. N. Monsarrat, Chairman.
G. H. Duggan.
W. J. Francis.
H. Holgate.
E. Marceau

The Gzowski Medal Committee:

G. A. Mountain, Chairman.
E. E. Brydone-Jack.
W. J. Stewart.
A. E. Doucet.
J. Galbraith.

Officers of Sections

General:

C. N. Monsarrat, Chairman.
W. J. Francis, Vice-Chairman.

Electrical:

R. M. Wilson, Chairman.
J. C. Smith, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
H. M. Jaquays, Vice-Chairman.

Mining:

J. B. Porter, Chairman.
H. P. DePencier, Vice-Chairman.

Committee on Publications:

G. H. Duggan, Chairman.
H. P. DePencier.
R. J. Durley, Secretary.
J. M. R. Fairbairn.
L. A. Herdt.

Committee on Meetings:

C. N. Monsarrat, Chairman.
The officers of Sections together with the Chairmen and Vice-Chairmen of Branches.

The Board of Examiners for admission of candidates under by-laws 8 and 9 is as follows:—

H. M. MacKay, Chairman.
A. Surveyer, Secretary.
R. S. Lea.
H. M. Jaquays.
H. P. DePencier.
A. M. Gray.
P. E. Mercier.
J. Flahault.
M. Beullac.

The following have been the Committees of the Society during the year:—

The Nominating Committee for Officers and Members of Council for the year 1914:

H. M. Jaquays, Chairman, representing District No. 1.
H. N. Ruttan, C. H. Rust, W. F. Tye, } Past Presidents.
F. W. W. Doane, representing District No. 2.
F. X. A. Leofred, " " " 3.
Jas. White, " " " 4.
J. G. Sing, " " " 5.
W. L. MacKenzie, " " " 6.
L. G. Robinson, " " " 7.

Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.

Improved Engineering Service:

H. Holgate, Chairman.
A. W. Campbell.
J. A. Jamieson.
F. L. Wanklyn.
G. J. Desbarats.
A. St. Laurent.
L. A. Vallee.
H. J. Lamb.

Establishment of Testing Laboratories:

C. H. Keefer, Chairman.
J. Galbraith.
H. M. Mackay.
Phelps Johnson.
J. A. Jamieson.
P. Gillespie.
G. E. Perley.
J. B. McRae.

Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Sewage Disposal:

John Kennedy, W. Chipman and R. S. Lea.

Steel Bridge Specifications:

C. N. Monsarrat, Chairman.
F. P. Shearwood.
J. G. LeGrand.
R. F. Uniacke.
G. H. Duggan.
N. M. McLeod.
H. G. Kelley.
W. A. Bowden.
P B. Motley.
F. C. McMath.

Conservation:

James White, Chairman.
C. R. Coutlee.
H. F. Laurence.
R. McColl.
R. O. Sweezey.
W. H. Breithaupt.
G. A. Bayne.
A. J. MacPherson.
J. S. Dennis.
J. B. Hegan.
C. E. W. Dodwell.
A. E. Doucet.
R. S. Lea.
R. W. Leonard.
E. E. Brydone-Jack.
W. R. W. Parsons.
John Chalmers.
T. H. Tracy.
J. B. Challies.
C. H. Mitchell.
Wm. McNab.

The Electro-Technical Commission:

L. A. Herdt, Chairman.
O. Higman.
H. T. Barnes.
L. W. Gill.
W. A. Duff.
L. A. Rosebrugh.
J. Kynoch.
J. Murphy.
A. B. Lambe.

Rails:

H. G. Kelley, Chairman.
G. A. Mountain.
J. M. R. Fairbairn.

Track, including the subjects of Fastenings, Tie Plates and Ties:

H. R. Safford, Chairman.
F. P. Gutelius.
A. C. Mackenzie.

Reinforced Concrete:

W. J. Francis, Chairman.
P. M. Morssen.
C. N. Monsarrat.
H. M. MacKay.
P. B. Motley.
E. Brown.
S. Baulne.
E. S. Mattice.
E. Brydone-Jack.
J. Galbraith.
H. Rolph.
P. Gillespie.

The awards of the Gzowski Medal and of prizes for the best students' papers will, in accordance with the practice of previous years, be announced during the meeting.

The following is a statement of elections which have taken place since the issue of Bulletin No. 9:

October 14th, 1913

Members:

Anderson, W.
Bligh, W. G.
Duffield, H. J.
Groves, F. W.
Kimball, H. S.
Larner, C. W.
Matheson, E. G.
McCormick, R. S.
Pearce, W.
Richardson, W. F.
Swinnerton, R. W.

Associate Members:

Begg, J. McG.
Brown, P. P.
Clemenston, N. E.
Corman, W. E.
Garbi, L., Jr.
Herren, P. H.
Joncas, J. P. P.
McLay, D. B.
Mitchell, A. K.
Perry, K. M.
Preston, F. M.
Rodger, W.
Shannon, J.
Soper, D.
Talbot-Crosbie, W. H.
Thrupp, E. C.
Wilson, J. A. G.

Associate:

Wilson, G. R. J.

Juniors:

Broderick, C. A.
Coumans, O. F.
French, M. H.
Gibault, J. E.
Langelier, J. N.
Maltby, Q. J.
Poitras, E.
Shaw, J. B.
Worthington, A. N.

Transferred from Associate Member to Member:

Allaire, A.
Campbell, D. McD.
Haddin, J.
MacPherson, F. L.
Murphy, J.
Powell, G. G.
Rinfret, R.
Roy, R. M.
Young, C. R.

Transferred from Junior to Associate Member:

Holdcroft, J. B.
Lount, C. T.
Pequegnat, M.
Pringle, J. F.
Vallee, I. E.

Transferred from Student to Associate Member:

Ballantyne, T. B.
Baribault, D. R.
Beach, F. K.
Beique, P. A.
Bertrand, J. E.
Brown, T. W.
Henry, R. A. C.
Linton, A. P.
McConkey, T. C.
McMahon, J. W.
Melsted, V. J.
Mudge, R.

Transferred from Student to Associate Member:

Cameron, H. D.
Chevalier, P.
Copp, W. P.
Cowen, R. P.
Dunkley, J. B.
Goedike, F. B.
Hall, N. M.
Hay, N. K.
Powell, W. H.
Richardson, C. E.
Simard, J. W.
Smith, A. W.
Trimingham, J. H.
Waddell, N. E.
Webb, C. E.
Whitton, C. F.

Transferred from Student to Associate:

Robertson, G. S.

Transferred from Student to Junior:

Arsenault, A.
Bacon, T. H.
Belanger, J. C.
Bell-Irving, D. P.
Brickenden, F. M.
de Cardaillac, R. E. M. G.
Carman, H. V. St. J.
Cole, F. T.
Cowley, F. P. V.
Duggan, H. S.
Lamb, S. R.
Lapointe, E.
Lee, R. B.
MacKinnon, K. R.
McKnight, R. C.
Middleton, J. R.
Millican, A. G.
Nares, B. L.
Neilson, L. R.
Plamondon, J. A.
Spencer, R. A.
Stewart, A. D.
Street, J. C.
Tessier, J. des R.
Tooker, G. L.
Whittaker, D.

November 11th, 1913

Member:

Junkins, S. E

Associate Members:

Booth, P. D.
Lee, C. A.
Murton, J. C.

Junior:

McLellan, R. A.

Transferred from Associate Member to Member:

Lea, W. S.

Transferred from Junior to Associate Member:

Hogarth, G. Rider, E. B.

Transferred from Student to Associate Member:

Brown, J. A.
James, E. W. McD.
Macauley, R. M.
MacDonald, J. J.
MacLennan, G. G.

Transferred from Student to Junior:

Burnett, G. K.
Day, H. S.
Scott, O. H.
Shanks, G. L.
Wilson, LeR.

December 9th, 1913

Associate Members:

Busfield, J. L. Greig, J. M. M.

Juniors:

Hetherington, W. B.
Kohl, G. H.
Macrae, L. P.
Morrisey, H. F.

Transferred from Associate Member to Member:

Angus, W. F.

Transferred from Student to Associate Member:

Benedict, E. McL.

Transferred from Student to Junior:

Dinsmore, F. L. Fraser, R. J.

General

The Council, having appointed the officers and standing committees for the year, at once entered upon the work of carrying out the instructions of the Annual Meeting.

The various national engineering societies were communicated with and the terms upon which their publications could be procured were ascertained and the information promptly forwarded to the Branches.

The commitment *re* appointment of Committees reporting to the Society was dealt with as follows:—

The Annual Meeting re-appointed the Committees on Establishment of Testing Laboratories, Educational Requirements, International Electro-Technical Commission, Conservation and Bridge Specifications.

It was decided that it was not necessary to re-appoint the Committee on Good Roads; and the Committees on Railway Ties, Roadbed and Ballasting and on Railway Fastenings and Tie Plates were re-organized under two Committees to be called a Committee on Rails and a Committee on Track.

It was also resolved to discontinue the Committee on Transportation Routes and to memorialise the Government as to the formation of a permanent Commission. This memorial is attached hereto. In connection with this matter, Messrs. W. F. Tye, C. R. Coutlee and J. A. Jamieson were requested to contribute such information as they had collected in regard to transportation routes as papers for the Transactions of the Society.

The two Committees on Sewage Disposal and the Special Committee on the same subject have been consolidated.

Having considered the proposal to appoint a Committee on Specifications for Steel Water Pipes, it was decided that it was not desirable to name such a Committee at the present time, but that the subject should be kept before the Society by means of a paper to be read at one of its meetings. Mr. F. H. Pitcher was requested to prepare such a paper.

After conference with various members of the Society engaged in concrete construction, a Committee was appointed to draw up a specification on the subject of reinforced concrete under the Chairmanship of Mr. Walter J. Francis, Member of Council. This Committee will present a report to the Annual Meeting.

The Specifications on Roadbed and Ballasting and on Steel Railway Bridges of Fixed Spans, approved at the last Annual Meeting, have been printed and distributed to members of the Society. The Society's specifications which have now been printed and are at the disposal of the engineering profession in Canada are the following:—Portland Cement, Cast Iron Water Pipe and Special Castings, Roadbed and Ballasting, and Steel Railway Bridges of Fixed Spans.

The opinion of the Society's solicitors was sought as to the conditions under which the Society, or a Branch of the Society, could be incorporated in British Columbia. The substance of the opinion was to the effect that a body capable of exercising general supervision over matters of interest to the profession in British Columbia, consisting of members whose relations to this Society should remain unaltered, could be established under legislative enactment.

In this connection the Vancouver and Victoria Branches were requested to definitely formulate the action they desired the Council to take and to outline such amendments to the Society's by-laws as they considered necessary in relation to the subject.

The Victoria and Vancouver Branches, replying to the communication of the Council, submitted the following recommendations:—

(1) That the parent Society will authorise the formation of a British Columbia Section of the Canadian Society of Civil Engineers: the said Branch to be governed by the existing Charter and By-Laws, and further amendments thereto of the parent Society.

(2) That the British Columbia Section shall include all members of the Canadian Society of Civil Engineers residing in this Province.

(3) That the British Columbia Section will be granted power to report on all British Columbia applicants for admission to the Society.

(4) That no candidate living in British Columbia will be admitted without the consent of the Executive of the British Columbia Section.

(5) That the Executive of the British Columbia Section will be given permission to collect rebates of annual fees from all members of the Society in this Province, and expend the sum thus realised in connection with the expenses of the Section, paying over a just proportion thereof to the Vancouver and Victoria Branches respectively, and in the future to any other Branch that may be hereafter formed in the Province.

(6) That the Executive of the British Columbia Section will be given power to discipline members living in British Columbia.

In consideration of these recommendations the Council, at a meeting held on August 6th, resolved that Sections or Divisions of the Society might be formed on the request of a majority of the Branches in any Province; that the existing by-laws in regard to Branches should not be changed, except that it should be possible for any member residing outside the 25 mile limit to join a Branch and become liable for the fees payable as a Branch member, the usual portion thereof to be remitted to the Branch.

It was not considered necessary that any financial arrangements should be made under the by-laws for the upkeep of the Provincial Divisions but that they should provide for their own operating expenses.

It was further agreed that recommendations Nos. 4 and 6 were not admissible; that in regard to recommendation No. 5 all dues must continue to be paid directly to Headquarters as heretofore, rebates being made to the Branches.

The matter was referred to a Committee of Council to draft a statement for revision of the by-laws in accordance with these findings, and it was decided in pursuance of the suggestion of the Annual Meeting to call a special meeting of Council for September 20th at which to consider the necessary amendments to by-laws in connection with the foregoing and in other directions. It was further arranged that the railway, sleeping car fares and all actual expenses while on the train should be paid to non-resident members attending the meeting. Members of Council residing in cities in which there are Branches of the Society were requested to get in touch with Branches and to represent the views of members to the Council in time for consideration at the September meeting.

The special meeting referred to was attended by the following Members of Council:—Mr. Phelps Johnson, President, in the Chair; Mr. W. F. Tye, Past President; Messrs. F. C. Gamble and H. H. Vaughan, Vice-Presidents; and Messrs. W. D. Baillairgé, E. Marceau, J. C. Kennedy, C. N. Monsarrat, G. H. Duggan, J. M. R. Fairbairn, R. J. Durley, A. F. Stewart, F. A. Bowman, H. E. T. Haultain, W. J. Francis, S. J. Chapleau and the Secretary. Two sessions were held and the proposals in regard to amendments to by-laws now before the membership were approved.

At a subsequent meeting of Council the proposals of the B.C. members, which are now also before the membership, were received and it was considered desirable to issue the circular letter attached to the proposed amendments to by-laws in explanation of them.

The place of holding the Annual Meeting has this year received more than usual attention in view of the fact that the British Columbia Branches extended a cordial invitation to the Society to hold the meeting in Victoria. The opinion of the membership was sought, and as a result of the postal card notice sent out some 700 replies were received, indicating a majority in favour of the meeting in British Columbia. Resolutions regarding the place of meeting were received from some of the Branches and expressions of opinion from non-resident Councillors and other members of the Society.

After a very full consideration the following resolution was adopted:—

> "That in view of the strong desire expressed by many of the members and Branches of the Society to hold a meeting in British Columbia in 1915, on account of the Panama Exposition to be held at that time and the opening of two transcontinental lines, and considering the impossibility of holding a meeting on the Pacific Coast in two successive years, it was decided that the meeting of 1914 should be held in Montreal."

This decision of the Council has been approved by the Executive of the Victoria Branch.

The Council desires to call the attention of the Meeting to the fact that the by-laws of the Society do not specify the place of holding the Annual Meeting, and suggests the desirability of an amendment in that regard.

The importance of holding meetings in the various cities of Canada is fully recognised and the Council, having given some thought to the subject, is of opinion that these meetings should take the form of a Summer Convention, the annual business meeting of the Society being held at Headquarters.

In the opinion of Council it would be well that the practice of holding one meeting of Council during the year, at which members from all parts of Canada could be present, should be established, and possibly such gathering might occur in connection with a summer convention.

In furtherance of the resolution adopted by the Annual Meeting regarding stream measurements, Mr. James White, Assistant to the Chairman of the Commission on Conservation, was asked to gather together all results of measurements made under the direction of the Dominion and Provincial Governments and to have the same published under the auspices of the Commission. Mr. White was kind enough to undertake this work should time permit.

The matter of improving the library facilities was undertaken in connection with the Library Committee with the result announced in the report of that Committee.

The Council has pleasure in reporting that in accordance with the suggestion of the last Annual Meeting a Junior Section of the Society has been formed. This Section has held several meetings during the year. Its officers at present are as follows:—

A. J. Kelly, Chairman. W. Clerk.
J. H. Norris. B. O. Smith.
R. M. Walker.

The Council reports the appointment of Mr. H. G. Kelley to fill the vacancy created by the death of Mr. J. M. Shanly at the close of the year 1912.

The vacancy created by the death of Mr. P. S. Archibald, which occurred on March 16th last, was not filled.

The Society has been represented at various gatherings during the year, amongst which may be noted the ceremony in connection with the placing of the window in Westminster Abbey in memory of the late Lord Kelvin, which ceremony was attended by Mr. W. F. Tye, Past President of the Society. Mr. H. J. Bowman represented the Society at an International Road Congress in London, of which the Society has now become a member. The Society was also represented at the Western Canadian Irrigation Convention by Messrs. H. B. Muckleston, F. H. Peters and P. M. Sauder.

The Council desires to call the attention of members to the importance of a more general response to the request accompanying the preliminary notice of applicants for admission and transfer, viz., that members are invited to report any facts which may affect the classification and election of any of the candidates and, where the professional career of applicants is known, they are specially invited to make a definite recommendation

as to classification. It is regretted that this invitation has not been generally accepted and that as a result classifications have been made which have subsequently given rise to criticism.

The financial statement presented herewith shows the total cost of the Society's building, which it is satisfactory to note is within the appropriation for the purpose and substantially in accord with the report made to the Society last year.

The Council desires to record its satisfaction at the interchange of courtesies through the Ottawa Branch with the American Society of Civil Engineers at its Convention in Ottawa in June last. This Convention was attended by a number of members of the Society who appreciated the hospitalities extended by their Ottawa brethren and the officers and members of the American Society of Civil Engineers.

Attention is called to the fact that a Branch of the Society has been established in Calgary under the Chairmanship of Mr. H. B. Muckleston. The Branches of the Society now number eight, in accordance with the list published on another page.

The attention of Council has been called to the establishment, or proposed establishment, of a Society of Municipal Engineers in Regina, and it has been reported that this Society proposes to seek exclusive legislation from the several Provincial Governments. The matter is being investigated by the Council.

Two volumes of *Transactions* were published and distributed during the year, namely, Volume II. for 1912 and Volume I. for 1913. Bulletin No. 9, giving lists of members elected between the date of the last Annual Meeting and July 1st, additions to the Library and general notes of the Society's affairs, was issued during the month of August.

The Council regrets that up to this date it has not been possible to obtain reports from all of the Committees for submission to the membership. Such reports as were in hand at the end of the year have been printed for distribution in advance of the Annual Meeting.

Acting on a suggestion at the Annual Meeting, the Council has, as already noted, made the attached representations to the Dominion Government with reference to the problem of transportation routes.

PHELPS JOHNSON, President.

C. H. McLEOD, Secretary

13th January, 1914

YOUR MEMORIALISTS have the honor to submit for the consideration of the GOVERNMENT OF CANADA, that the time is now opportune to appoint a ROYAL COMMISSION on TRANSPORTATION and allied problems.

The early opening of the Panama Canal and the great development in all lines of industry from one end of Canada to the other, raise questions demanding the most careful solution.

---

(1) The report of the Transportation Commission made in 1898 contains a great deal of valuable data, but is now largely obsolete.

(2) That such a Commission should consist of seven members, viz.:—one Railway Engineer, one Hydraulic Engineer, one Railway Manager, a Lawyer, a Transportation Manager familiar with Lake and Ocean Navigation, two eminent business men, one from the East, one from the West, and a secretary.

(3) That such report should include and, whenever possible, make recommendation on the following matters:

(a) WATER ROUTES.—River improvement, lake and gulf dealing with existing systems—proposed systems from the commercial and engineering sides, harbors, docks, graving docks, types of ships and barges for inland service.

(b) WINTER AND OTHER PORTS.—National and local, required facilities and equipment having regard to the handling of grain, merchandise, manufactures, coal and the other heavy bulk products to the end that the most economical method be secured.

(4) There is a necessity for an even, steady movement of traffic throughout the year. How may this be accomplished at the least possible cost to the people of Canada?

(5) The water power possibilities, as an incident of navigation on the St. Lawrence, Ottawa, and other important rivers. It is believed by competent men that the St. Lawrence may be converted into slack water navigation from Montreal to Lake Ontario by the building of about five dams and five ship canal locks, and that as an incident thereto, several million horse-power of energy may be had at very low cost. Such a possibility suggests a development in manufacturing of incalculable value to the country and would seem worthy of special report.

The existing canal system on the St. Lawrence is expensive to maintain and operate. The suggested system would seem to offer an opportunity for large savings in both respects.

(6) RAILWAYS:

(a) EXISTING RAILWAYS.—In what respect is it possible to improve, having regard to terminals, receiving and delivering freight in large cities and at other important points? How may transportation be rendered more economical?

(b) What should be the policy of the country regarding new railways? What conditions should be made on behalf of the public?

(c) EARNINGS AND EXPENSES.—A reasonable definition of what they should be.

(d) COMPETITION.—To what end can it be secured?

(e) REGULATION.—To what extent should it extend in order that capital may be secured for the continued requirements of the country and the public be sufficiently protected?

(7) ROUTES AND OUTLETS:
The Atlantic Seaboard.
The Pacific Seaboard.
The Hudson Bay.
The Great Lakes.

(8) YOUR MEMORIALISTS, the CANADIAN SOCIETY OF CIVIL ENGINEERS, represent practically every qualified engineer in Canada. It is with a knowledge of the importance of the subject and of how easily great mistakes, causing enormous waste of money, can be made, that YOUR MEMORIALISTS have approached the subject, in the hope that your honorable body may see fit to grant such a Royal Commission to the end that our common country may be benefited.

(Signed) PHELPS JOHNSON, President.
C. H. McLEOD, Secretary.

Montreal, December 1st, 1913.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

The Library Committee has pleasure in reporting a most progressive year. Additions to the reading matter have been very extensive in the endeavour to bring it up to date in all sections. The new volumes were carefully chosen or approved by the Chairmen of the different sections and the list was supplemented by members of the Committee. A list of these books will be found in Bulletin No. 9.

The purchase of the new Encyclopaedia Britannica has been recommended to the incoming Council.

The thanks of the Society are especially due to Mrs. P. A. Peterson, who has kindly presented to the Library many volumes of engineering works which belonged to the late Mr. P. A. Peterson, Past President of the Society.

The subscription to Nelson's Perpetual Loose Leaf Encyclopaedia has been renewed, and members may still avail themselves of the Research Bureau.

This Committee superintended the moving and setting in order of the library in its new quarters, which occasioned very extensive labour; also the furnishing of the storage and reading rooms of the new building. The Committee has recommended some further additions to the furnishing of the rooms.

Requests for exchange of Proceedings have been received from various Societies and those which were considered advisable were acceded to as noted herein.

The subscriptions to technical journals have been renewed.

The following works have been presented:—

"La Resistenza delle Artiglierie." By Leone Coupaye and Pietro Malaval of the French Naval Artillery. Translation and Preface by Comm. Ettore Bravetta. Paper, pp. 260. Turin, 1913.
Presented by COMM. ETTORE BRAVETTA.

"Report of Public Works Department, Boston, 1911." O. Half Cloth, pp. 583. Boston, 1912.
Presented by L. K. ROURKE, Com. of Public Works, Boston.

"The Making of a Great Canadian Railway." By F. A. Talbot. O. Cloth, Illus. and Map, pp. 349. Musson Book Co., Toronto, 1912.
Presented by S. W. CROWELL, Jr. Can.Soc.C.E.

"Producer Gas." By J. E. Dowson and A. T. Larter. O. Cloth, Illus. pp. 304, 2nd Edit. Longmans & Green, London, 1907.
Presented by L. E. KENDALL, Jr.Can.Soc.C.E.

"The Diversion of the Waters of the Great Lakes etc." By Lyman E. Cooley. O. Cloth with Maps, pp. 216. Sanitary District of Chicago, Feb. 1913.
Presented by THE AUTHOR.

"Earthwork Haul and Overhaul." By J. C. L. Fish. O. Cloth, pp. 165. Figs. and Diagrams. J. Wiley, New York, 1913. 1st Edit.
Presented by E. M. RENOUF PUB. CO.

"The Subways and Tunnels of New York." By Gilbert, Wightman & Saunders. 1st Edit. Cloth, pp. 265. Figs. and Plan. John Wiley, New York, 1912.
Presented by H. R. HAMILTON.

"Report of Progress of Stream Measurement for 1911." Paper.
Presented by E. F. DRAKE, Supt. of Irrigation, Ottawa.

"Report of Proceedings of 12th Congress, Philadelphia, 1912, of International Association of Navigation Congresses."
Presented by THE ASSOCIATION, Brussels.

"Commission of Conservation, Canada, 1912. Third Annual Report."
Presented by THE COMMISSION.

"Irrigation Engineering." By H. M. Wilson, C.E. Nar. O. Linen, Illus. pp. 625. 6th Edit. London and New York, 1911.
Presented by H. W. E. CANAVAN, M.Can.Soc.C.E.

"Principles of Irrigation Engineering etc." By Fred. H. Newell and D. W. Murphy. Nar. O. Linen, Illus., pp. 293. London and New York, 1913.
Presented by F. X. AMOSS, Jr.Can.Soc.C.E.

"A Glance at the Victoria Bridge and the Men who Built It." By Chas. Legge. Nar. O. Linen, pp. 153. Montreal, 1860.
Presented by JOHN KENNEDY, M.Can.Soc.C.E.

"The Theory and Design of Structures." By E. S. Andrews. Cloth. 3rd Edit. London, 1913.
Presented by THE PUBLISHERS, CHAPMAN & HALL.

"Further Problems in Theory and Design of Structures." By E. S. Andrews.
Presented by THE PUBLISHERS, CHAPMAN & HALL.

"Paint Technology and Tests." By H. A. Gardner. Linen, pp. 266, Illus. McGraw-Hill, New York and London.
Presented by HOWARD COOPER, A.M.Can.Soc.C.E.

"The Practical Design of Irrigation Works." By W. G. Bligh, M.Can. Soc.C.E. Linen, pp. 449, Illus. Constable & Co., Ltd., London, 1912. 2nd Edit.
Presented by THE AUTHOR.

Two framed pictures of the Skeena River Bridge.
Presented by F. C. MCMATH, M.Can.Soc.C.E.

A photograph of the new Quebec Bridge.
Presented by G. F. PORTER, M.Can.Soc.C.E.

The Journal of the American Peat Society (1908-13).
Presented by THE AMERICAN PEAT SOCIETY.

Presentations have been made by the following members as noted above:—

Amoss, F. X., Jr.Can.Soc.C.E.
Bligh, W. G., M.Can.Soc.C.E.
Canavan, H. W. E., M.Can.Soc.C.E.
Cooper, Howard, A.M.Can.Soc.C.E.
Crowell, S. W., Jr.Can.Soc.C.E.
Hamilton, H. R., Jr.Can.Soc.C.E.
Kendall, L. E., Jr.Can.Soc.C.E.
Kennedy, John, M.Can.Soc.C.E.
McMath, F. C., M.Can.Soc.C.E.
Porter, G. F., M.Can.Soc.C.E.

The following is a complete list of periodicals, magazines, transactions etc. regularly received and on file in the library.

Those marked † are paid for; all others are exchanges.

Those marked * are bound at the end of each year and placed on the shelves in the General Reading Room.

American Architect, *New York.*
*American Society of Civil Engineers, Transactions and Proceedings, *New York.*
*American Society of Mechanical Engineers, Transactions, *New York.*
*American Society for Testing Materials, *Philadelphia.*
American Institute of Architects, Quarterly Bulletin, *Washington.*
*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*
*American Institute of Mining Engineers, Transactions, *Philadelphia*
American Railway Engineering Association, *Chicago.*
American Water Works Association.—Proceedings.
Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico*
"Antonio Alzate" Scientific Society, Transactions, *Mexico.*
Australian Inst. of Mining Engrs.
Armour Institute of Technology.
Association of Engineering Societies, Journal of, *New York.*
Association of Ontario Land Surveyors, Annual Report, *Toronto.*
Barge Canal, Bulletin, *New York.*
Bibliographie des Sciences et de l'Industrie, *Paris.*
Board of Water Supply of the City of New York, *New York.*
Boletin de Ingenieros, *Mexico.*
Boston Public Library, Bulletin and Annual Report, *Boston.*
Boston Society of Civil Engineers, *Boston.*
Brooklyn Engineers' Club, Proceedings, *Brooklyn.*
Builders' Bulletin, *Montreal.*
Bureau of Railway Economics, *Washington.*

Bureau of Standards, Bulletin, *Washington.*
Bureau of Mines, *Washington, D.C.*
Bureau of Mines, Report, *Canada.*
Bureau of Railway Economics, *Washington.*
Canadian Engineer, *Toronto.*
Canadian Electrical News, *Toronto.*
*Canadian Institute, Transactions, *Toronto.*
Canadian Machinery and Manufacturing News, *Toronto.*
†Canadian Magazine, *Toronto.*
Canadian Manufacturer, *Toronto.*
Canadian Mining Institute, Transactions, *Montreal.*
Canadian Mining Journal, *Montreal* and *Toronto.*
Canadian Municipal Journal, *Montreal.*
Canadian Patent Office Record, *Ottawa.*
Canadian Railway and Marine World, *Toronto.*
Carnegie Library of Pittsburg, *Pittsburg.*
Cassier's Magazine, *New York.*
Cement Record, *Kansas City, Mo.*
"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*
†Century, The, *New York.*
†Chambers' Journal, *London, Eng.*
Cincinnati Public Library, *Cincinnati.*
Cleveland Engineering Society Journal and Transactions, *Cleveland.*
*Cleveland Institute of Engineers, Transactions, *Middlesborough.*
Colorado School of Mines, Bulletin, *Golden, Cal.*
Construction, *Toronto.*
Contract Record, *Toronto.*
Cornell Civil Engineer, *Ithaca, N.Y.*
Crerar Library Reports, *Chicago.*
Department of Colonization, Mines and Fisheries, *Quebec.*
Department of Marine and Fisheries, *Ottawa.*
Department of Mines, *Ottawa.*
Department of Naval Service, *Canada.*
Department of Public Works, *Ottawa.*
Department of Railways and Canals, *Ottawa.*
Department of the Interior, *Ottawa.*
Electric Journal, *Pittsburg.*
†Electric Railway Journal, *New York.*
Electrical Review and Western Electrician, *Chicago.*
Electrical Review, *London, Eng.*
Electrical World, *New York.*
Engineers' Club, *Baltimore.*
*Engineers' Club of Philadelphia, Proceedings, *Philadelphia.*
*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*

Engineering & Contracting, *Chicago.*
*Engineering News, *New York.*
Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*
Engineering Standards Committee Reports, *London, Eng.*
Ferro Concrete, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
Harbour Commissioners' Report, *Montreal.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieur, *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Magazine, *Cleveland.*
Industrial Engineering and the Engineering Digest, *New York.*
Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*
*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Conciliation, *New York.*
International Electro Technical Commission, *London, Eng.*
International Waterways Commission, *Ottawa.*
Interstate Commerce Commission, *Washington, D.C.*
†Iron Age, *New York.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumiere Electrique, *Paris.*
La Technique Moderne, *Paris, France.*
*Liverpool Engineering Society, Transactions, *Liverpool.*
†London Magazine, *London.*
A Magyar Mernok-es Epitesz-Egylet, *Budapest.*
Machinery, *New York.*
Marine Review, *Cleveland, Ohio.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*

Mines and Methods, *Salt Lake City, Utah.*
Mining and Metal. Soc. of America.
Mines and Minerals, *Scranton.*
*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Motor Car Journal, *London, Eng.*
Municipal Engineering, *Indianapolis.*
New Orleans Sewerage and Water Board, Report, *New Orleans.*
New York Department of Health, *New York.*
New York Ry. Club, *New York* (*presented by* MR. VAUGHAN).
North of England Institute of Mining and Mechanical Engineers, *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle.*
Nova Scotia Institute of Science, *Halifax.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
†Power, *New York.*
Providence, City of, Annual Report, *Providence.*
Professional Memoirs, Corps of Engineers, U. S. Army.
Public Health Journal, *Toronto.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*
Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railway Journal of Canada, *Toronto.*
Railway Age Gazette, *Chicago.*
Railway Master Mechanic, *Chicago, Ill.*
Revista Technologico Industrial, *Barcelona.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng.*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*
Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*

Schóol of Mines, Quarterly, Columbia College, *New York.*
†Scribner's, *New York.*
†Sketch, *London, Eng.*
Smithsonian Institution, Reports, *Washington.*
Sociedad Cubana de Ingenieros, *Havana, Cuba.*
Societe Scientifique Industrielle de Marseilles, *Marseilles.*
Societe Industrielle de l'Est, *Nancy, France.*
Societe Industrielle du Nord de la France, *Lille, France.*
Societe des Ingenieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
The Steamship, *London.*
Technical Index, *London, Eng.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Army, Corps Engineers—Professional Mem., *Washington, D.C.*
U. S. Army—Report, Chief Engineer, *Washington, D.C.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*
Valve World.
Western Australian Institution of Engineers, *Perth, Australia.*
*Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*
Zeitschrift fur Architecten u. Ingenieurwesen, *Hanover.*
Zeitschrift des Osterreichischen Ingenieur u. Architekten Vereines, *Vienna.*

University Publications:

Dalhousie University, Calendar, *Halifax.*
McGill University, Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal*
University of Illinois, Bulletin, *Urbana, Ill.*
University of Manitoba, *Winnipeg, Man.*
University of North Dakota, Quarterly Journal, *North Dakota.*
University of Toronto, Trans. Engineering Soc., *Toronto*

University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

It was agreed to exchange publications with the following in addition to the above:—University of Pennsylvania, University of New Brunswick, Cleveland Public Library, Washington University Library, Purdue University Library, Maine Society of Civil Engineers.

Respectfully submitted,

F. P. SHEARWOOD,
Chairman.

January 10th, 1914.

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1913

Receipts		
SUBSCRIPTIONS—		
Arrears of Fees Collected	$1,994.35	
Current Fees	15,037.29	
Advance Fees	186.05	
Entrance Fees	4,169.00	
		$21,386.69
INTEREST—		
Savings Bank Account	12.15	
Special Deposit Receipt	247.80	
Canadian Northern Montreal Land Co., on balance of purchase price of Dorchester Street property to 30th April	522.74	
Overdue Fees	112.21	
		894.90
Sales of Transactions and Periodicals		187.81
DIVIDENDS—		
Can. Per. & West. Can. Mtg. Co. Stock	13.50	
Montreal Light, Heat & Power Co. stock	19.00	
		32.50
Rent of Hall		5.00
Forward		$22,506.90

Expenditure		
INTEREST—		
On Mortgage to 31st Dec. 1913	$1,658.00	
On Bank Overdraft	36.96	
		1,694.96
Printing and Stationery, including Transactions		6,416.22
Books, Magazines and Library Expenses		611.69
Postage, Post Cards and Telegrams		1,546.56
Salaries of Secretary and Office Staff		3,955.00
Caretaker's Wages		951.00
Taxes		1,253.80
Water Rates		212.43
Rent of Old Building		250.00
Expenses—Annual Meeting	227.21	
Expenses—Ordinary Meetings	161.85	
Expenses—Special Council Meeting	352.85	
		741.91
Coal and Wood		365.89
Electric Light and Power		141.36
Gas		25.74
House Supplies		75.35
Insurance		59.25
Telephone, Rent and Tolls		107.71
Cabs, Cartage, etc		13.45
Sundries		302.31
Auditors		100.00
Bank Commission		33.58
Forward		$18,858.21

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1913

Receipts	
Carried forward..	$22,506.90
	$22,506.90

Expenditure		
Carried forward		$18,858.21
Legal Expenses.....		745.89
Examiners' Fees.....		126.50
Czowski Medal.....		9.75
Rebates of Fees to Branch Societies—		
Toronto.....	$575.00	
Quebec.....	100.00	
Winnipeg.....	398.50	
Ottawa.....	600.00	
Vancouver.....	280.50	
Kingston.....	50.00	
Victoria.....	116.50	
		2,120.50
Total Expenditure on Revenue Account.....		$21,860.85
Balance—Being Excess of Receipts over Expenditure on Revenue Account for year ending 31st December 1913.....		646.05
		$22,506.90

Verified, Riddell, Stead, Graham & Hutchison, C.A.,
Auditors.

Montreal, 13th January, 1914.

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AS AT 31st DECEMBER, 1913

Assets		
PROPERTY ACCOUNT—		
Building, 176 Mansfield Street....		$88,873.46
FURNITURE—		
Balance at 31st December 1912.	$1,344.72	
Added during year.....	1,724.81	
	$3,069.53	
LESS 10% written off for Depreciation.....	306.95	
		2,762.58
BOOKS—Estimated value.....		6,000.00
ARREARS OF FEES—Estimated Value		5,000.00
CANADA PERMANENT & WESTERN CANADA MORTGAGE CORPORATION STOCK.....		180.00
MONTREAL LIGHT, HEAT & POWER CO. STOCK—		
Balance at 31st December 1912.	140.50	
LESS—Received for sale of rights..	20.00	
		120.50
GOLD MEDAL.....		45.00
SPECIAL BANK DEPOSIT RECEIPT....	$5,000.00	
Interest accrued thereon.	33.70	
		5,033.70
CASH ON HAND.....		154.34
BALANCE IN BANK OF MONTREAL....		130.70
Forward		$108,300.28

Liabilities			
PRIZE FUND ACCOUNT.....			$ 468.77
ROYAL INSTITUTE FOR THE ADVANCEMENT OF LEARNING—			
Mortgage on Mansfield St. Property at 6%...	$20,000.00		
Interest accrued thereon to date.....	200.00		
			20,200.00
ACCOUNTS PAYABLE.....			3,236.23
SUNDRY REBATES DUE TO BRANCHES.....			183.00
SURPLUS—			
Balance at 31st Dec. 1912.....		$38,687.04	
ADD —Amount received for sale of Old Building	$60,000.00		
LESS —Book Value.....	15,493.86		
		44,506.14	
Receipts on Revenue Account.....	$22,506.90		
LESS —Disbursements...	21,860.85		
Forward		$646.05	$83,193.18 $24,088.00

CANADIAN SOCIETY OF CIVIL ENGINEERS

STATEMENT OF ASSETS AND LIABILITIES AS AT 31ST DECEMBER, 1913

Assets	
Carried forward.....	$108,300.28
	$108,300.28

Liabilities			
Carried forward....	$646.05	$83,193.18	$24,088.00
Estimated Value of Books added to Library.....	680.00		
		1,326.05	
		$84,519.23	
LESS—Written off for Depreciation on Furniture 10%.....		306.95	
			84,212.28
			$108,300.28

Montreal, 13th January, 1914.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

COST TO DATE OF NEW BUILDING

Paid to University Club..			$47,100.00
Architects' Fees.....	(Nobbs & Hyde).....		2,951.34
Reid, McGregor & Reid..	Masons.....	$30,031.95	
J. A. Gordon.....	Plumbing.....	5,814.51	
P. Lahee & Co.....	Electric Wiring.....	1,697.82	
Papering.....		229.40	
Douglas Bros.....	Dampers for ventilating system.....	115.00	
Gardner & Gaskill.....	Altering electric fan.....	27.75	
G. F. Byers.....		485.00	
Hutchison & Sticht.....	Switch Box.....	30.00	
R. E. Jones.....	Oiling and polishing floors.....	327.30	
Sundries.....		63.39	
			38,822.12
			$88,873.46

Furnishings

F. C. White.....	Electric Fixtures.....	$896.00	
J. J. Taylor.....	Vault Door.....	65.00	
Shelving.....		217.00	
Linoleum.....		304.10	
Electric Lamps.....		35.00	
Sundries.....		207.71	
			1,724.81
			$90,598.27

Obituaries

White, Sir William Henry, Hon. M. Can. Soc. C. E., was born at Devonport, England, February 2, 1845. After attending the local schools he was apprenticed at the Royal Naval Dockyard in 1859, where he attended the Dockyard School in connection with his practical work. In 1864 he was a member of the first class to enter the Royal School of Naval Architecture at South Kensington and graduated in 1867 with the highest honours. Immediately after graduation Sir William was engaged as Private Secretary to Sir Edward Reed, Chief Constructor of the Admiralty, dealing with scientific problems in naval architecture. Following the resignation of Sir Edward Reed, White was made Professional Secretary to the Commission appointed to carry on Reed's work. In 1875 he was appointed Assistant Constructor and in 1881 Chief Constructor of the British Navy. In 1883 he accepted the offer of Sir William Armstrong to organise the Warship Department of the new shipyard at Elswick. Two years later he returned to the Admiralty to become Director of Naval Construction and Assistant Controller of the Navy, a position which he held until compelled to resign because of ill health in 1902. After recovery from his illness Sir William engaged in practice as Consulting Naval Architect until his death, February 27, 1913, following a paralytic stroke, terminated his career.

Sir William had a prominent part in the development of the ships of the British Navy from the old wooden type to the steel vessels of the present day. Many innovations such as torpedo boats, the first dreadnoughts, and the use of water tube boilers were brought into the Navy and developed during his regime. While Consulting Naval Architect he held many important positions of which the most noteworthy were: member of the Cunard Commission which decided the type of machinery to be used in the *Lusitania* and the *Mauretania;* Director of the Parson's Marine Turbine Co., and of the Grand Trunk Railway Co.; member of the Government Commission to investigate the question of load lines of merchant ships.

Sir William was elected an honorary member of this Society in 1907, and has manifested a lively interest in its progress. He was president of the British Institution of Civil Engineers in 1904, during the summer of which a distinguished group of members of the Institution visited Canada under the auspices of this Society.

* Archibald, Peter Suther, M. Can. Soc. C. E., was born at Truro, Nova Scotia, on March 21st, 1848, and received his education in the Truro Model and Normal Schools. He began his professional career as a rodman on the preliminary surveys for the Intercolonial Railway in September, 1867, under Sir Sandford Fleming, and, during the construction of the road and its subsequent operation, he rose by sheer ability and application from one position to another, until in 1879 he became Chief Engineer of the Intercolonial Railway which he had helped to construct as a boy. This position he held until his resignation in 1898 to take up private practice as a Consulting Engineer.

He was Consulting Engineer of the St. John Cantilever Bridge and Railway Extension Co. by special permission of the Minister of Railways. In 1894 he was appointed a member of The Royal Commission to enquire into freight rates in Manitoba and the North-West Territories. In 1902 he was Chairman of an Arbitration Tribunal between Contractor Reid and the Newfoundland Government involving a two million dollar claim, and later was Chairman of the Arbitration Board to settle the controversies regarding the Newfoundland Telegraph lines. Later he was employed as an expert in disputed matters between the Clergue Syndicate and its Contractors on Railway Construction. In 1905 he was Contractors' Engineer for Mr. A. E. Trites on the construction of the Northern Maine Seaport R. R., now part of the Bangor and Aroostock R.R. In 1907 he was appointed a member of the Conciliation Board re the Cumberland Coal & Railway Co., under the Industrial Disputes Act. In 1908 he was made a Commissioner by the New Brunswick Government to manage the New Brunswick Central Railway.

Mr. Archibald was one of the original members of the Canadian Society of Civil Engineers and was a Member of Council at the time of his death which occurred March 16, 1913.

Bonzano, Adolphus, M. Can. Soc. C. E., was born December 5, 1830, at Ehingen, Germany. His early education was received at the gymnasia of Ehingen, Dinsdorf and Stuttgart. As a youth he came to America with his father who had emigrated to Texas where he settled with a German colony. In 1850 he came to Philadelphia where he acquired a thorough knowledge of the English language. Two years later he entered the Reynolds Machine Works as an apprentice and subsequently became superintendent of the works. After a varied experience in machine works and railway shops he became superintendent of bridge construction in the Detroit Bridge and Iron Works in 1865. After spending three years in Detroit Mr. Bonzano removed to Phoenixville to take the position of chief engineer of the Phoenixville Bridge Works with the firm of Kellogg, Clarke & Co. which later became Clarke, Reeves & Co. This firm was

* Prepared by Mr. William B. MacKenzie, M. Can. Soc. C. E.

dissolved in 1884 and the Phoenix Bridge Co., a stock company of which Mr. Bonzano was Vice-President and Chief Engineer, was organized. He held this position until 1893 and during this period superintended the construction and erection of many important bridges.

From 1893 to 1898 he was a member of the firm of Bonzano & Clarke, New York, Consulting Engineers, but in 1898 on the death of his partner, he retired from active business and occupied himself chiefly with the promotion of his inventions of which the Bonzano rail joint is perhaps the best known.

Mr. Bonzano was an early member of the Canadian Society of Civil Engineers. He was also a member of the American Society of Civil Engineers, of the American Society of Mechanical Engineers and of the American Institute of Mining Engineers.

He died at his home in Philadelphia, on May 5, 1913.

BRITTAIN, ALFRED, M. Can. Soc. C. E., son of the late James Brittain, an English railway engineer of note, was born in Norwich in 1840. Mr. Brittain came to Canada in 1866 with the Royal Engineers and entered the service of the City of Montreal as Assistant City Surveyor, a situation which he held for thirty-five years. During this time he designed and built practically all the sewers laid by the City. Mr. Brittain was one of the original members of this Society and while not a charter member he was associated with the charter members in its formation. He retired because of ill health, some ten years before his death on May 7, 1913.

FARLEY, RICHARD WILLIAM, M. Can. Soc. C. E., was born at Chelsea, Que., January 17, 1861. After passing the preliminary examinations of the Quebec Board of Land Surveyors in 1879, he was articled to Bolton Magrath, Esq., P.L.S., of Aylmer, Que. In 1882 Mr. Farley entered the office of the Crown Lands and Timber Agent, at Hull, Que., and was appointed Crown Lands Agent in 1886, when he obtained his license as Provincial Land Surveyor. After engaging in private practice as Land Surveyor for a number of years he took charge of the Survey Branch Crown Timber Office at Hull, from 1893 to 1897. He was also city engineer of Hull from 1889, and in 1897 devoted himself almost entirely to the development of this city until 1907 when he took up his residence in Ottawa. He died November 23, 1913.

FRANCIS, GEORGE BLINN, M. Can. Soc. C. E., who died suddenly, June 9, 1913, was born at West Hartford, Connecticut, January 31, 1857. In 1874 he became a student in the engineering department of the Providence, R.I., Water Works. Three years later he was transferred to the City Engineers' Department where he remained until 1881 when he took up railway work. After eleven years spent with various railroads he became, in 1892, resident engineer on the construction of the Providence terminal of the New York, Providence & Boston & Old Colony R.R. From 1896 to 1900 Mr. Francis was Resident and Acting Chief Engineer for the Boston Terminal Co., designing and constructing the South Ter-

minal Station. He was Chief Engineer of the Street Railway System of Providence from 1900 to 1902 when he removed to New York to become Chief Civil Engineer for Westinghouse, Church, Kerr & Company, in charge of design and construction of electric railways, subways, power plants and buildings.

His specialty was the construction of railway terminals and in addition to his work at Providence and Boston he had a large part in the design and construction of the Pennsylvania Terminal at Manhattan. Several Canadian terminal projects received his attention, such as the Vancouver C.P.R. Terminal, the G.T.P. Terminal, at Winnipeg, and others.

Mr. Francis became a member of the Canadian Society of Civil Engineers in 1906. He was also a member of the American Society of Civil Engineers to which he contributed several papers; the Institution of Civil Engineers of Great Britain; the Boston Society of Civil Engineers; and the New York Railroad Club.

MACFARLANE, ALBERT GEORGE, M. Can. Soc. C. E., was born at Almonte, Ont., January 1st, 1861. He began his professional career in 1882 when he was engaged by the Kingston & Pembroke Ry. as chainman. From this time onward he held various positions with different railroads, becoming divisional engineer of the Ottawa, Arnprior & Parry Sound Ry. in 1894. From 1894 to 1897 he had charge of the building of this railway from Scotia Junction to Depot Harbour, including the bridges on this part of the line. During the period from 1901 to 1905, Mr. Macfarlane held the position of locating engineer on the Canadian Northern Ry. From 1905 he was engaged in the capacities of divisional and district engineer on the National Transcontinental Ry., which position he occupied up to the time of his death which occurred suddenly in Ottawa, on April 4th, 1913.

MCPHILLIPS, GEORGE, M. Can. Soc. C. E., who died November 20, 1913, at Winnipeg, after a long illness, was a native of Richmond Hill, Ont., where he was born April 26, 1848. After being educated in the grammar school of his home town he passed the examinations of the Dominion, Ontario and Manitoba Land Surveyors and began his professional career in 1869 as transitman on the Toronto and Nipissing Railway. After several years' experience surveying in Manitoba, Mr. McPhillips was appointed, in 1882, Engineer of the County of Selkirk, Man., where he had charge of the drainage of the St. Andrews and Point du Cheyne marshes west of Winnipeg. About the same time he was locating engineer of the Souris and Rocky Mountain Railway. In 1886 he was engineer of the Windsor and Walkerville Electric Railway, the first electric railway to be built in Canada. He subsequently took up municipal engineering work in Windsor, Ont., as City Engineer. In 1906 he became surveyor on the Western lines of the Canadian Pacific Railway and remained in the service of this corporation until his illness forced him to retire.

*Peterson, P. Alex., M. Can. Soc. C. E.—On the 21st November, 1913, there passed away, in Montreal, Mr. P. Alex. Peterson, a civil engineer who took a leading part in railway construction in Canada, during the latter part of the nineteenth century.

Mr. Peterson was born in Niagara Falls, Ontario, on the 8th November, 1839, and in July, 1859, after a thorough school education, he was articled to Mr. Thomas C. Keefer, Past President and Honorary Member of this Society, who was, at that time, Chief Engineer of the Hamilton Water Works, and of the Hamilton & Port Dover Railway.

Mr. John Kennedy, now Consulting Engineer to the Montreal Harbour Commissioners, was employed in Mr. Keefer's office at the same time.

While Mr. Peterson was Assistant to Mr. Keefer he was employed on the Hamilton & Port Dover Railway, the Hamilton Water Works, and on a survey for a canal from Georgian Bay to Toronto, his headquarters being at Hamilton during 1859 and 1860, and afterwards at Toronto until 1863.

From 1863 to 1865 he was engaged on various engineering works under Mr. Keefer, and in July, 1863, he obtained license to act as an Ontario Land Surveyor, having been articled as pupil in surveying to Mr. T. C. Keefer.

In May, 1865, Mr. Peterson left Mr. Keefer's office and went into practice on his own account and, during 1865 and 1866, he had charge of the re-construction of three large dams on the Grand River, to replace those which had been carried away by floods caused by "ice jams."

In the Summer of 1867 he made surveys, plans and estimates for the Petrolia Branch of the Great Western Railway; and in the Autumn of 1867 he was appointed resident engineer of the Northern Division of the New York & Oswego Midland Railway. In March, 1868, he was appointed resident engineer of the Bathurst Division of the Intercolonial Railway in New Brunswick, the construction of which was then being commenced, and he remained in that position until September, 1872, when he resigned on being appointed Chief Engineer of the Toronto Water Works, then about to be constructed at a cost of two million dollars.

Previous to 1875 Mr. Peterson had been elected a member of the British Institution of Civil Engineers, and in January, 1876, he was elected a member of the American Society of Civil Engineers, and was a Vice-President in 1896 and 1897.

About the end of 1875 Mr. Peterson left the Toronto Water Works on being appointed by the Quebec Government Chief Engineer of the Montreal & Ottawa Section of the Quebec, Montreal, Ottawa & Occidental Railway, which was, at that time, partly constructed between Quebec and Ottawa except the portion from Terrebonne to Montreal, the location of which was under discussion.

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* Prepared by H. Irwin, M. Can. Soc. C. E.

Mr. Peterson strongly urged the adoption of the direct line from a point near Berthier to Montreal via Bout de l'Isle, including a large bridge at the latter place, the Government, however, in June, 1878, obtained a report from the late Mr. Walter Shanly advocating the line via Terrebonne, St. Vincent de Paul and St. Martin's Junction, with two large bridges and with two long, heavy grades up to and down from Mile End, and the latter was adopted and has proved "a thorn in the side" ever since, while the Canadian Northern Quebec line has adopted Mr. Peterson's route.

Mr. Peterson's "forte" was the location and construction of bridges, and while Chief Engineer of the Q.M.O. & O. Ry., he had charge of the construction of several bridges including the Chaudiere Bridge between Hull and Ottawa, having one span of 254 feet, one of 160 feet, ten of 150 feet and one of 135 feet; and large bridges over the Rouge, North Nation, Lievres and Gatineau Rivers.

In 1881 he was appointed, by the Canadian Pacific Railway Company, Chief Engineer of the Atlantic & North West Ry. Co., under the Charter of which the C.P.R. built the line from Mile End Station, near Montreal, to connect with the International Railway of Canada at Lennoxville, and at the same time built from the International Boundary near Megantic to Mattawamkeag in Maine, under another Charter.

The St. Lawrence Bridge at Caughnawaga is on this line and the piers were strong enough with necessary lengthening to carry the heavy double track steel work which was completed only a month before Mr. Peterson's death. On the same line were several large steel bridges and trestles, including a bridge over the Richelieu River, and high trestles at Ship Pond and Wilson Stream.

Mr. Peterson was also Chief Engineer of the Sault Ste. Marie Bridge and of the Mission River Bridge, in British Columbia, and many other important works.

He continued to act as Chief Engineer of the A. & N.W. Ry., and as Engineer of Eastern Lines of the C.P.R., until his appointment as Chief Engineer of the C.P.R., in 1890, which position he held until February, 1902, when, owing to ill health, he was appointed Consulting Engineer.

In August, 1903, he was appointed Chief Engineer of the Guelph & Goderich Ry., then being constructed by the C.P.R., and remained in that position until 1908, when he retired from work owing to failing health.

He was a Charter Member of the Canadian Society of Civil Engineers, of which he was a Vice-President in the years 1889, 1892 and 1893, and President in 1894.

Being of rather nervous disposition he was, at first, sometimes thought to be slightly abrupt in manner, but his unvarying courtesy soon removed that impression.

Mr. Peterson was universally known as a most conscientious engineer, was strict yet fair in dealing with contractors, was very kind hearted, and

always willing to do a good turn to any of his staff, though he required from them close attention to their work and whole hearted discharge of their duty to their employers.

Ross, James, M. Can. Soc. C. E., was born at Cromarty, Scotland, July 28, 1848. At the age of seventeen he took up engineering and spent five years on railway and harbour construction before coming to America in 1870 to engage in railway work. He was at first resident and later chief engineer of the Ulster and Delaware Railway. In 1872 he was resident engineer on the Wisconsin Ry. and subsequently held a similar position on the Lake Ontario Shore Road. In 1875 Mr. Ross accepted the position of chief engineer of the Victoria Railway of which he was also manager until 1880, when he became general superintendent of the Credit Valley Railway. He entered the service of the Canadian Pacific Railway in 1883 as manager of construction on the Mountain Division. After the line over the Rockies was completed Mr. Ross was transferred to the Eastern Division of the C.P.R. in 1886. In 1888 he took up his permanent residence in Montreal but did not cease his activity in railway work as he contracted for and built the Regina and Long Lake Ry. in 1888, and the Calgary and Edmonton Ry. in 1889. Mr. Ross became interested in electric railways in 1892 and undertook the development of the street railways of Montreal, Winnipeg and St. John, installing electric service instead of the old horse lines. He joined with Mr. William Mackenzie in the purchase and electrification of the Toronto Street Railway in 1892. These two men continued their association and in 1896 acquired and developed the tramways system of Birmingham, and later secured a franchise and charter to build electric railways on the Island of Jamaica.

During the later years of his life Mr. Ross took a prominent part in business affairs in Montreal. He was for several years Vice-President and Managing Director of the Montreal Street Railway; Director of the Bank of Montreal; President of the Dominion Coal Co., and of the Dominion Bridge Co. He was President of the Art Association of Montreal; a trustee of Bishop's College, Lennoxville; a governor of the Royal Victoria Hospital, Montreal; and a governor of McGill University. He became a member of the Canadian Society of Civil Engineers in 1888, and was also a member of the American Society.

He died April 20, 1913, at his home in Montreal.

Skaife, Wilfrid Theodore, M. Can. Soc. C. E., was born in Montreal, April 5, 1859. After graduating in Civil Engineering from McGill University in 1880 with the special Scott prize, he spent three years in Germany, France and Austria studying Chemical Engineering with especial reference to practical sugar making. On his return to Montreal in 1884 he was employed by the Canada Sugar Refining Co. as head chemist. In 1893 Mr. Skaife, after an unsuccessful attempt to start a beet sugar industry at Berthier, Que., removed to Cuba to engage in the sugar business there. In 1899 he was appointed General Manager of the

Constancia Sugar Co., Cienfuegas, Cuba., whose very extensive plant and railways he constructed. He held this position until 1903, when he returned to Montreal in ill health. He died in Montreal, April 9th, 1913.

Sproule, William Johnston, M. Can. Soc. C. E., was born in Shomberg, Ont., 19th May, 1851. He was educated at the Normal School, Toronto, and McGill University, where he graduated as B.Sc. in 1877, being Valedictorian and Gold Medallist of that year. He subsequently obtained the degree of Master of Engineering, M.E., McGill, and was also a Dominion and Provincial Land Surveyor. On leaving College he took up railroad work and was engaged on the Pittsburg & Pennsylvania Rys., and also assisted in laying out part of the City of Winnipeg. In 1878 he joined the engineering staff of the Montreal Harbour Commission, under Mr. John Kennedy, C.E., chief engineer. He served as assistant chief engineer to the Harbour Commission for many years, and retired on a pension some three years before his death. In this position he had full responsibility during the absence of his chief. He was also in charge of the ship channel until the Government took it over in 1888. When the new wharves were built he drafted the plans for the freight sheds on them. The first dyke for flood prevention at Montreal was erected under his supervision. Among other important positions held by Mr. Sproule was that of expert in a dispute between the Canadian Pacific Ry. and some contractors; he was also a member of the Montreal Dry Dock Commission. Mr. Sproule served as both Councillor and Mayor of the town of St. Lambert, Que., where he had a residence and did good and permanent work there, especially in supervising the waterworks. He was one of the original members of the Society and served on the Council during the years 1895 and 1896. He died on 6th February, 1913.

Jodoin, Edouard, A. M. Can. Soc. C. E., a member of one of the old and well known French families of Montreal, was born March 26, 1881. His early education was received at St. Mary's College, Montreal, from which he proceeded to the Ecole Polytechnique. After graduating with honors in 1902 he became assistant engineer in the Dept. of Public Works, Ottawa. In 1904 he was transferred to the Dept. of Marines. From 1905 to 1907 he was instrumentman on the National Transcontinental Railway. In 1907 Mr. Jodoin was appointed Assistant Engineer on the Canadian Government Hydrographic Surveys, a position which he held until his death, April 2, 1913.

Lynn, William Lambert, A. M. Can. Soc. C. E., was born at Portsmouth, England, March 14, 1860. He was a son of the late William Lynn, Chief Engineer for many years of H.M. Dockyard. He received his early education at Harrow and then entered the Dockyard as a student under his father and Sir Edward Reed, Chief Constructor of H.M. Navy. After a thorough practical training he removed to Australia where he engaged in land surveying. In 1882 he joined the Egyptian Campaign receiving honorable mention along with the Khedive Star, Queen's Medal

and bar. In 1888 he left Queensland and crossed to Seattle where he became engineer in charge of construction of docks and wharves for the Oregon Improvement Co. When this work was completed in 1891 he came to Canada to take up mining and construction work. He was engaged by the Dominion Government to construct the Docks and R.R. yards at Mulgrave and Point Tupper, N.S., in 1900 and 1901. From 1901 to 1906 he was Mining Engineer for the N.S. Government under the late Dr. Gilpin, Deputy Minister of Mines. In 1906 he became Divisional Engineer on the Trent Valley Canal a position which he held until 1909 when he was appointed Acting Drainage Engineer by the Provincial Government of Alberta. Subsequently he was engaged in private practice up to within two months of his death which took place December 1, 1913.

Willson, Russell D, A. M. Can. Soc. C. E., was born at Sharon, Ontario, November 20, 1877. He graduated from the School of Practical Science, Toronto, in 1901. His vacations were spent in survey work on the Toronto-Sudbury line of the Canadian Pacific Ry. In 1899 he interrupted his college course to spend a year in the Engineer's office of the C.P.R., at Toronto, and later took part in the construction of the plant of the Sturgeon Falls Pulp and Paper Company. After graduation Mr. Willson spent five years on the engineering staff of the Canadian Northern Ry., in Winnipeg. In 1906 he entered the employ of the City of Winnipeg as second Assistant Engineer where he had charge of various works including the location of the tramway to Point Du Bois Falls. He was appointed Assistant City Engineer in 1908 with practically complete charge of the construction and operation of the waterworks department. On November 17, 1913, Mr. Willson, in the course of an inspection of the electrical equipment of the waterworks system, met instant death by coming into contact with an electric potential of 13,000 volts.

Robertson, James Melville, Jr. Can. Soc. C. E., was born at Stirlingshire, Scotland, February 11, 1886. He was educated at Allen Glen School, Glasgow, and at the Glasgow & West of Scotland Technical College which he attended while serving his apprenticeship with Messrs. Wharrie and Colledge, Civil Engineers, Glasgow. He afterwards became assistant engineer with this firm and was engaged in supervising the construction of various road-making and sewerage contracts.

He came to Canada in 1908 and entered the service of the Canadian Pacific Railway, first as draftsman and later as transitman, in the Maintenance of Way Department. From November, 1909, to the time of his death he was resident engineer on construction of part of the Alberta Central Railway, including a large bridge over the North Saskatchewan River, at Rocky Mountain House, Alberta. He was accidentally killed by the discharge of a rifle, at Sylvan Lake, Alberta, September 14, 1913.

Brownell, Norman Wesley, S. Can. Soc. C. E., was born in Winnipeg, December 26, 1892. He entered the engineering department of the University of Manitoba in 1911, when he also became a student member of this Society. He died June 19, 1913.

Cole, Harold Franklin, S. Can. Soc. C. E., was born at Ottawa, June 25, 1889. His early education was given him at Ottawa and in 1908 he entered McGill University having won a C.P.R. scholarship. His studies at McGill were not continuous as he spent a year as rodman with the C.P.R. before entering his second year. In 1912 he was unable to return to College because of ill health. He died May 13, 1913, at his home in Ottawa.

Discussion on Report of Council

Mr. Leofred — In discussion of the Report, Mr. F. X. A. Leofred inquired if the western members of the Society were dissatisfied with the Annual Meeting being held this year in Montreal. He had understood the wishes, especially of the British Columbia members, to be that a meeting should be held on the Pacific Coast.

Mr. Rust — Mr. C. H. Rust, on behalf of the British Columbia members, stated that he had not heard any expression of disapproval of the arrangement in regard to the present Annual Meeting. He understood, however, that there was a general desire that a meeting of the Society should be held on the Pacific Coast next year.

The President — The President remarked that the decision of the Council not to hold a meeting in British Columbia at the present time had met with the entire approval of the British Columbia Branches. It was to be borne in mind that next year there would be two new trans-continental railway lines in operation, over one of which at least it would be important for the Society to make an excursion; and, further, that the fact of the Panama Exposition being held at the same time would probably have an important bearing on the success of any excursion to the Coast.

On motion by Mr. C. H. Rust, seconded by Mr. M. J. Butler, the Report was adopted.

The Report of the Library and House Committee was taken as read and received, and on motion by Mr. E. Marceau, seconded by Mr. F. B. Brown, the Report was adopted.

The Report of the Finance Committee, as contained in the Report of Council, pp. 29—33, was received on motion by Mr. L. G. Papineau, seconded by Mr. W. D. Lawrence.

Mr. Brayley — Mr. H. V. Brayley inquired what the item $5,000.00 under Assets represented.

The Secretary — The Secretary stated that the amount was placed as a special deposit in the Bank instead of in the ordinary current account in order that the bank interest might be obtained thereon.

Mr. Brayley — Mr. Brayley inquired if this amount in any way represented commuted fees.

The Secretary — The Secretary in answer stated that life membership fees had only been paid in one or two cases, the fee for life membership being $150.00.

Mr. Brayley — Mr. Brayley inquired as to the actual amount of arrears of fees which was valued in the statement at $5,000.00.

The Secretary — The Secretary replied that this amount had been the estimated value of arrears for several years and that the auditor was of opinion that it was still a fair estimate of the arrears as an asset. He would, however, present a detailed statement of the matter in the afternoon.

Mr. Brayley — Mr. Brayley inquired as to the item Accounts Payable, $3,236.23.

The Secretary replied that this was chiefly composed of the amount due to printers, which was an open account. The Secretary

Mr. Brayley further inquired as to the distribution of the various items of Fees—Arrears, Current, Advance and Entrance—and asked if current fees were specially appropriated for maintenance of the Society and entrance fees for building. He thought it would be desirable that some such arrangement should be made. Mr. Brayley

The President replied that the whole revenue of the Society was necessary for running expenses, and called attention to the fact that at the end of the year there only remained a credit balance of $646.00 The President

On motion by Mr. G. A. Mountain, seconded by Mr. W. J. Francis, the Report of the Finance Committee was adopted.

The President directed the attention of the meeting to the reception and discussion of the reports of the various Committees as published and distributed in advance of the meeting. The President

REPORTS OF COMMITTEES, JANUARY, 1914.

REPORT OF THE COMMITTEE ON TRACK.

MR. C. H. MCLEOD,
Secretary, Canadian Society of Civil Engineers,
Montreal.

DEAR SIR,—

Referring to your letter of May 15th, announcing the creation of a Committee on Track, composed of Messrs. F. P. Gutelius and A. C. MacKenzie and the writer, I beg to advise that, owing to a tremendous pressure of business, we were not able to hold a meeting until the 1st instant. This meeting was attended by Mr. MacKenzie and myself.

The subject assigned to the Committee is a very large and comprehensive one and the work to be carried on should be in accordance with a well defined programme, and, in order to conform to the wishes of the Council as to procedure, it seems to us that the Council should give a general outline of the subjects which should be first attacked.

This is the procedure generally followed in associations of this nature and is the one which we think will obtain the best results from the Committee.

The Committee is so small that we do not think we can carry on effective research work in a satisfactory manner, because in the work associated with track matters it is quite desirable that results obtained by the Committee should be after a very general study by the Committee, which should be representative not only as to individual railroads but locality. We are, therefore, impressed that there should be an increase in the membership of this Committee to at least eight or ten, and a Committee of this size can accomplish much more effective work.

We, therefore, recommend for consideration by the Council the following action.

1. That the Council shall instruct as to the general subjects it would desire given first attention, and we might suggest that two be selected from the following list:.

Recommended specifications for tie plates.
Recommended specifications for angle bars.
Recommended specifications for various classes of tie treatment.
Recommended specifications for bolts, spikes, etc.
Recommended practice as to size of ties.
Recommended practice as to character of timber.

Recommended practice as to proper tie spacing.

Economics of Track Labor, embracing the following:

(a) Proper methods of conducting track work.

(b) Proper methods of measuring efficiency.

(c) Equating track values.

(d) Method of educating section foremen, and numerous other subjects could be suggested.

2. That the Committee membership be increased to ten.

We believe in the creation of this Committee the membership should not be entirely confined to railroad engineers, as there will be some features involved where it would be desirable to have the benefit of the views of men connected with steel manufacture, treatment of ties and other subjects which are associated with materials going into track use.

Respectfully submitted,
H. R. SAFFORD,
Chairman.

COMMITTEE

H. R. Safford, Chairman — A. C. MacKenzie.
F. P. Gutelius

MONTREAL, December 18th, 1913.

REPORT OF THE CANADIAN COMMITTEE OF THE INTERNATIONAL ELECTROTECHNICAL COMMISSION

The above Committee begs to report that during the first part of the year 1913 the Commission was very actively engaged in bringing to their final form the reports of the Special Committees on the Rating of Electrical Machinery, on Symbols, and on Nomenclature; in order that they might be presented at the then forthcoming Congress in Berlin, Germany.

This Congress was held as scheduled in the early part of September, and adopted to a large degree the above Reports, and also the recommendations of the National Laboratories of England, France, Germany, and the United States as to the characteristics of standard annealed copper. Through the courtesy of the Honourable W. B. Nantel, Minister of Inland Revenue, the Canadian Committee was able to send a representative in the person of the local Secretary, Mr. A. B. Lambe. A full report of the Meeting, which was attended by some seventy delegates, representing about twenty-four countries, will be issued shortly and will be obtainable

on application to the Secretary of the Canadian Committee, but in the meantime, as evidence of the growing influence of the Commission, it might be mentioned that requests were received that the publications of the Commission be issued in German and Spanish as well as in English and French; further, that the Russian government, through the National Committee of that country, has extended an invitation for the 1917 Congress to be held in St. Petersburg.

The General Secretary of the Commission, Mr. C. le Maistre, expects to pay Canada a visit early next year, on his way through to New York and San Francisco, in preparation for the next Congress, which is to be held in the latter city in 1915.

With the exception of Mr. J. J. Wright, of Toronto, who has resigned owing to business reasons, the membership and officers of the Canadian Committee remain as last year, namely—

L. A. Herdt, Chairman.	L. W. Gill.
O. Higman, Vice-Chairman.	J. Kynoch.
H. T. Barnes.	J. Murphy.
W. A. Duff.	T. R. Rosebrugh.

A. B. Lambe, Secretary-Treasurer.

L. A. HERDT,
Chairman.

OTTAWA, December 31st, 1913.

COMMITTEE ON REINFORCED CONCRETE

CANADIAN SOCIETY OF CIVIL ENGINEERS

DRAFT OF STANDARD GENERAL SPECIFICATIONS

FOR

CONCRETE AND REINFORCED CONCRETE

Revised to December 23, 1913

MEMBERS OF COMMITTEE

S. Baulne.
E. Brown.
E. Brydone-Jack.
J. Galbraith.
P. Gillespie.
H. M. MacKay.
E. S. Mattice.
C. N. Monsarrat.
Michael Morssen.
P. B. Motley.
H. Rolph.
Walter J. Francis, Chairman.

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70.—Tests of Materials.
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MATERIALS

1. CEMENT.

"Cement" shall be Portland cement complying in every particular with the "Specification for Portland Cement and Standard Methods of Testing" adopted by the Canadian Society of Civil Engineers.

As far as practicable the same brand shall be used throughout each piece of work.

2. SAND.

"Sand" shall be natural or artificial silicious material having particles graded from fine to coarse. It shall be free from dust, soft particles, vegetable loam or other foreign matter. The particles shall be of such a size that all will pass through a circular hole 1-8" in diameter in a thin plate and that none will pass through a circular hole 1-100" in diameter in a thin plate.

3. CRUSHED STONE.

"Crushed Stone" shall be silicious or calcareous material having fragments graded from fine to coarse. It shall be made by crushing natural rock or boulders having a crushing strength of at least 6,000 pounds per square inch, and be free from flat pieces, dust, soft particles and foreign matter. It shall be clean, hard and durable. The fragments shall be generally uniform in shape and of such a size as to pass through a circular hole 2½" in diameter in a thin plate and that none will pass through a circular hole 1-8" in diameter in a thin plate.

4. GRAVEL.

"Gravel" shall be the naturally produced material corresponding in every particular to the requirements of crushed stone.

5. CINDERS.

"Cinders" shall be hard, clean, vitreous clinker, thoroughly vitrified, crushed to such a size that all will pass through a circular hole 2½" in diameter in a thin plate and none will pass through a circular hole 1-8" in diameter in a thin plate, and be free from sulphides, ashes, coal, coke or any material combustible at a temperature below 1,500° Fahrenheit.

6. WATER.

"Water" shall be fresh water and be free from oil, acid, alkalies or organic matter.

7. STEEL

"Steel" shall have the properties set forth in Section 30, and be free from loose mill scale, excessive rust, oil or other foreign matter.

8. MORTAR.

"Mortar" shall be composed of cement, sand and water.

9. CONCRETE.

"Concrete" shall be composed of mortar and crushed stone or gravel, or of mortar and crushed stone and gravel.

10. CINDER CONCRETE

"Cinder Concrete" shall be composed of mortar and cinders.

11. REINFORCED CONCRETE.

"Reinforced Concrete" shall be composed of concrete in which steel of small sectional area is systematically embedded at the time of depositing the concrete for the purpose of forming a composite structure in which the component parts act in unison in resisting applied forces.

12.—REINFORCED CINDER CONCRETE.

"Reinforced Cinder Concrete" shall be composed of cinder concrete in which steel of small sectional area is systematically embedded at the time of depositing the cinder concrete for the purpose of forming a composite structure in which the component parts act in unison in resisting applied forces.

13. RUBBLE CONCRETE.

"Rubble Concrete" shall be the mass obtained by embedding boulders, fragments of rock, or both, in concrete while being deposited in place.

METHODS OF CALCULATION

14. PROPORTIONING OF PARTS.

Every structure of concrete or of reinforced concrete shall be so designed that any possible combination of loading thereon will not produce stresses of greater intensity than the unit stresses given in this specification.

15. Loading Generally.

The loads to be resisted shall be considered to consist of the dead load and the live load.

The dead load shall be the weight of the structure itself and any other fixed loads.

The live load shall be all loads other than dead loads.

The loads shall be reduced to their static equivalents by a recognized method of design. All dynamic, vibratory and impact effects shall be considered and provided for.

16. Loads on Building Columns.

In the case of columns in buildings which support three or more floors, reduction of live load may be made in accordance with this section, except in the case of buildings such as warehouses in which the floors are liable to be fully loaded simultaneously. For the columns supporting the roof and top floor the full live load shall be taken. For the succeeding columns taken in order, the full live load on such columns may be reduced successively by 5% until a reduction of 50% is reached. For all lower columns the live load shall be taken as at least 50% of that used in calculating the floors.

17. Span of Beams and Slabs.

The span of beams or slabs shall be the clear span plus the depth of beam or slab, but need not exceed the distance from centre to centre of supports. Brackets shall not be considered as affecting the clear span in this connection.

18. Bending Moments of Beams and Slabs.

Taking "w" to represent the equivalent static load per unit length of span of beam or slab, and "l" to represent the span length, the following bending moments shall be used,—

(1) For beams or slabs supported at both ends without constraint, $+\frac{wl^2}{8}$

(2) For beams or slabs continuous over three or more equal spans, $+\frac{wl^2}{12}$ at centres of interior spans and $-\frac{wl^2}{12}$ over their intermediate supports; and $+\frac{wl^2}{10}$ at the section of maximum bending moment in end spans and $-\frac{wl^2}{10}$ over their inner supports.

(3) For beams or slabs continuous over two equal spans only, $-\frac{wl^2}{8}$ over the centre support, and $+\frac{wl^2}{10}$ at the section of maximum bending moment in the spans.

When the spans are of unequal lengths, or when special cases of loading arise, the bending moments shall be computed on statical principles, and due regard shall be paid to the influence of constraint at the supports in determining the maximum bending moments in the spans.

19. Assumptions for Stresses in Beams and Slabs.

The stresses in beams and slabs due to the bending moment shall be determined from the principles of the bending of homogeneous beams, using the following assumptions,—

(a) that the modulus of elasticity of concrete in compression is constant,

(b) that the tensile resistance of concrete is negligible, and the steel reinforcement carries all the tension,

(c) that plane transverse sections of a beam before bending remain plane after bending,

(d) that the steel and concrete are properly bonded together, and that in beams reinforced on the compression side the two materials are stressed in compression in the ratio of their moduli of elasticity,

(e) that initial stress in the beam due to shrinkage of the concrete is negligible,

(f) that the depth of a beam is measured from the extreme compression layer to the centre line of the tension reinforcement.

20. Proportioning of Tee-Beams.

In beam and slab construction the design shall provide efficient bond between the slab and beam. The slab shall be regarded as forming part of the compression area of the beam. The effective width of slab so acting shall not exceed one-fourth of the span of the beam, and the overhang on either side of the stem of the beam shall not exceed four times the slab thickness, nor twice the width of stem of the beam.

Where a tee-beam is continuous, as at a column, and the bending moment undergoes reversal the stresses due to the end moment shall be computed as for a rectangular beam reinforced on both tension and compression sides. The compressive stress in the concrete may be 15% greater than the maximum specified in Section 27.

21. Proportioning of Slabs.

When the reinforcement of the slab runs in one direction only computations shall be made by the formulae for simple beams.

When employing slab systems where the reinforcement runs in two or more directions the designer shall use his judgment in the interpretation of theories regarding stresses therein, and of experimental results obtained from slabs so reinforced.

22. Proportioning of Piers and Columns.

When the unsupported length of a compression member subjected to axial load does not exceed six times the least dimension of its effective area, it shall be deemed a pier, and if its unsupported length exceed the above limit, it shall be deemed a column. All columns shall be reinforced.

The effective area of a column shall be the area included within the line circumscribing and touching the outermost reinforcing.

The diameter of a column shall be the least dimension of its effective area.

The length of a column shall be measured between its lateral supports, neglecting bracketing, and shall not exceed fifteen times its diameter.

UNIT STRESSES

23. Ultimate Compressive Strength of Concrete.

In the absence of tests on concrete made from the materials to be used, the following values shall be taken as the ultimate compressive strength of concrete, twenty-eight days after mixing, having the proportions of ingredients as set forth.

	Ultimate compressive strength in pounds per square inch				
Proportion of ingredients (cement, sand, crushed stone or gravel)	1:1:2	1:1½:3	1:2:4	1:2½:5	1:3:6
Kind of crushed stone or gravel					
Granite, trap rock	3300	2800	2200	1800	1400
Gravel, hard limestone or hard sandstone	3000	2500	2000	1600	1300
Soft limestone or soft sandstone	2200	1800	1500	1200	1000

24. Compressive Stress in Piers and Abutments.

The compressive stress in concrete piers and abutments shall not exceed 22.5% of the ultimate compressive strength of the concrete.

25. Bearing Stress on Piers and Abutments.

The bearing stress on piers and abutments shall not exceed one-third of the ultimate compressive strength of the concrete, if the compression be applied to a surface of concrete less than one-half the surface of the pier or abutment, otherwise the bearing stress shall not exceed 22.5% of the ultimate compressive strength of the concrete.

26. Compressive Stress in Columns.

The safe axial load on columns shall be determined by the following formulae,—

(1) Columns with longitudinal reinforcing only,

$$P = Af_c \left[1+(n-1)p\right]$$

(2) Hooped columns,

$$P = Af_c \left[1+(n-1)\ (2.4\,h+p)\right]$$

in which P = safe axial load, in pounds.

A = effective area of column, in square inches.

A_s = sectional area of longitudinal steel embedded in the concrete, in square inches.

$$p = \frac{A_s}{A}$$

f_c = 22.5% of the ultimate compressive strength of the concrete, in pounds per square inch.

n = modular ratio of steel to concrete = 15.

$$h = \frac{\text{volume of circumferential reinforcing.}}{\text{volume of column enclosed}}$$

$\frac{P}{A}$ shall not exceed 45% of the ultimate compressive strength of the concrete.

For columns with longitudinal reinforcing only, p shall not be less than 0.01 nor more than 0.04.

Columns shall be deemed hooped columns when h is not less than 0.0075 nor more than 0.015, and when p is not less than 0.01. The value of (h+p) for hooped columns shall not exceed 0.05, and h shall not exceed p.

The length of a hooped column shall not exceed ten times its diameter as defined in Section 22.

27. Compressive Stress in Beams.

The compressive stress at the extreme layer of beams shall not exceed 30.0% of the ultimate compression strength of the concrete. The estimated compressive stress due to the end moment on a continuous beam may be allowed to exceed this value by 15%.

28. Shearing Stress in Beams.

The shearing stress, v, in the concrete of beams shall be computed by the following formula,—

$$v = \frac{V}{bjd}$$

in which V = total shear at any section, in pounds.
b = breadth of a rectangular beam, or of stem of tee-beam, in inches.
d = depth of beam, in inches.
jd = distance from tensile reinforcing to centre of compression, in inches.

For beams having tension reinforcing only, v shall not exceed 2% of the ultimate compressive strength of the concrete.

For beams in which part of the tension reinforcing is bent, as opportunity offers, so as to provide inclined shear reinforcing, the value of v shall not exceed 3% of the ultimate compressive strength of the concrete.

For beams in which v exceeds 3% of the ultimate compressive strength of the concrete additional shear reinforcing shall be provided in the form of stirrups inclined or normal to the tension reinforcing and looped around or connected to it. Using the above notation and letting s = spacing of stirrups, in inches, each stirrup shall be designed to withstand a pull of $\frac{2}{3}\frac{V_s}{jd}$ if set normally to the tension reinforcement, and a pull of seven-tenths of this amount if inclined at 45° to the tension reinforcing. The spacing of the stirrups shall not exceed the depth of the beam. Stirrups shall be of such a length that they approach within two inches of opposite faces of the beam, and they shall be so anchored or bonded that they can develop the pull for which they are designed. The value of v for beams so reinforced shall not exceed 6% of the ultimate compressive strength of the concrete.

29. Bond Stress.

The bond stress between concrete and steel shall not exceed 4% of the ultimate compressive strength of the concrete for plain or deformed bars, nor 2% of the ultimate compressive strength of the concrete for drawn wire.

30. Modular Ratio.

The ratio of the modulus of elasticity of steel to that of concrete shall be taken as 15.

31. STEEL.

Steel for reinforcing shall have the following physical properties,—

	Medium Steel Bars		High Carbon Steel Bars		Cold-Twisted Bars from Medium Steel as specified
	Plain	Deformed	Plain	Deformed	
Ultimate Tensile Strength, in pounds per sq. inch = T.....	55,000 to 70,000	55,000 to 70,000	Minimum of 80,000	Minimum of 80,000	
Elastic Limit, Minimum, in pounds per sq. inch.....	33,000	33,000	50,000	50,000	55,000
Elongation, Minimum, per cent. in 8 ins...	1,400,000 / T	1,250,000 / T	1,200,000 / T	1,000,000 / T	5%
Cold Bend Without Fracture (d = diameter, t = thickness).					
For bars where d or t is less than ¾".....	180° d=t	180° d=t	180° d=3t	180° d=4t	180° d=2t
For bars where d or t equals or is greater than ¾"	180° d=t	180° d=2t	90° d=3t	90° d=4t	180° d=3t

For each 1-8" increase in diameter or thickness above ¾" nominal diameter or thickness, and for each 1-16" decrease in diameter or thickness for bars below 7-16" nominal diameter or thickness a deduction of 1% shall be made from the above specified percentage of elongation; but these modifications for elongation shall not apply to cold twisted bars.

Material shall be free from injurious seams, flaws or cracks, and shall have a workmanlike finish.

Bars shall preferably be rolled from billets.

Cold twisted bars shall have at least one complete twist in a length equal to twelve times the thickness of the bar.

Re-rolled bars more than 1″ in diameter shall not be accepted.

32. Unit Stresses for Steel.

The following unit stresses for steel shall not be exceeded,—

In Tension,

Medium steel, 16,000 pounds per square inch.

High carbon steel and cold-twisted bars, 20,000 pounds per square inch.

Re-rolled bars, 12,000 pounds per square inch.

In Compression,

All steel, 15 times the specified unit stress for the concrete in which it is embedded.

GENERAL REQUIREMENTS IN DESIGN

33. Limiting Proportions of Ingredients of Mortar Generally.

Not more than three parts of sand shall be added to one part of cement.

To make mortar, the exact proportions shall be determined before the commencement of the work, having in mind the strength and density required and the characteristics of the materials to be used.

34. Limiting Proportions of Ingredients of Concrete Generally.

To make concrete when using a mortar composed of one part of cement and one part of sand, not more than two parts of crushed stone or gravel shall be used; when using a mortar composed of one part of cement to one and one-half parts of sand, not more than three parts of crushed stone or gravel shall be used; when using a mortar composed of one part of cement to two parts of sand, not more than four parts of crushed stone or gravel shall be used; when using a mortar composed of one part of cement to two and one-half parts of sand not more than five parts of crushed stone or gravel shall be used; when using a mortar composed of one part of cement to three parts of sand, not more than six parts of crushed stone or gravel shall be used.

The exact proportions of the ingredients shall be determined before the commencement of the work, having in mind the strength and density required and the characteristics of the materials to be used.

35. Proportioning of Ingredients for Waterproof Concrete.

Where waterproofness is necessary the proportions of ingredients of the concrete shall be determined by experiment to obtain the requisite strength and the maximum density.

36. Limiting Proportions of Ingredients in Concrete for Beams etc.

In building construction one mixture shall be used throughout for girders, beams and slabs. In no case shall there be used a mortar con-

taining more than two and one-half parts of sand to one part of cement, and to this mortar there shall be added not more than five parts of crushed stone or gravel.

37. Limiting Proportions of Ingredients in Concrete for Columns.

In building construction one mixture shall be used throughout for columns. In no case shall there be used a mortar containing more than two parts of sand to one part of cement, and to this mortar there shall be added not more than four parts of crushed stone or gravel.

38. Crushed Stone or Gravel for Fireproof Concrete.

Where fireproofness is necessary, crushed stone or gravel containing more than 5% of limestone shall not be used.

39. Fireproofing.

The steel reinforcing shall be protected by at least 3-4" of concrete in floor slabs, by at least 1½" of concrete in beams, and by at least 2" of concrete in columns.

In concrete piers and abutments which may be subjected to the action of fire the outside concrete for a depth of 1½" shall be considered as a protective covering and shall not be computed in determining the effective area of the pier or abutment.

40. Spacing of Steel.

The distance from centre to centre of adjacent bars shall not be less than the perimeter of the larger of the bars.

In slabs the distance from centre to centre of adjacent bars shall not exceed twice the depth of the slab.

41. Splicing of Steel.

As far as practicable all reinforcing bars shall be in one length. Welds shall be made, and the length of laps determined, so as to develop the full strength of the bar.

42. Minimum Lengths of Slab Reinforcing.

The ends of slab reinforcing shall completely cross the beam or girder on which the slab rests.

43. Reinforcing in Columns.

Vertical reinforcing bars shall be carried into the footings a sufficient distance to transmit the stress in the steel to the concrete of the footing by means of bearing and bond stresses. The bars of the lower sections of columns shall extend above the upper surface of the slab a sufficient distance to enable the bars of the next succeeding section of column to be effectively bonded with them.

Reinforcing bars over 1" diameter may have their ends faced true and be butted with a sleeve not less than 12" long.

The steel ties holding the vertical reinforcing in its assigned position shall not be more than 12" apart.

44. Contraction Joints.

Contraction joints shall be provided unless sufficient steel is embedded to safely withstand temperature changes.

In mass concrete subjected to temperature changes construction joints shall be provided at abrupt changes of section, and preferably at sections not more than forty feet apart.

WORKMANSHIP

Mortar and Concrete

45. Foundations.

The foundations shall be trimmed as accurately as practicable and shall be at least as large as the dimensions on the approved drawings. Form work shall be erected wherever foreign material can become mixed with the concrete or mortar while the same is being deposited.

The bearing stratum shall be cleaned of all foreign material. It shall also be free from water if practicable. Under no circumstances shall mortar or concrete be deposited in running water.

46. Form Work.

Form work shall be substantially and accurately constructed. It shall be plumb and true to line, well fixed, braced and supported to carry the imposed loads, and be rigid enough to retain proper alignment and correct contours until the concrete will have become well set. Form work shall be sufficiently tight to prevent leakage. Immediately before depositing concrete the form shall be carefully cleaned out, after having been finally trued up. A coating of soft soap or oil may be applied to new forms. Such a coating shall be applied in every instance where form work is to be used more than once. Form work that has been previously used shall be thoroughly cleaned before re-erection and given a protecting coat of the same material as that already used on it. Form work shall be so fastened together that it may be removed without injury to any part of the permanent structure.

47. Storage of Cement.

Cement shall be stored in a weather-tight ventilated building. The floor of the building shall be raised above the ground to ensure dryness.

The cement shall be neatly piled in carload lots in the original sacks, and be marked in a distinctive manner for identification purposes.

48. Storage of Sand, Crushed Stone and Gravel.

All sand, crushed stone and gravel shall be piled on a site which has been cleaned free from vegetable and other foreign materials.

49. Measuring of Ingredients.

One sack of cement containing 87½ pounds net shall be taken as equivalent to one cubic foot of cement. All sand, crushed stone and gravel shall be measured by loose volume.

The necessary amount of water to produce the required consistency of mortar or concrete shall be determined from time to time, taking into account the atmospheric conditions and the variations of moisture in the sand, crushed stone or gravel before mixing.

All of the materials shall be systematically measured throughout the whole of the work, and the required proportions shall be accurately maintained.

50. Mixing of Ingredients.

All mortar and concrete shall be made in batch mixers unless it is impracticable to do so, in which case it shall be mixed by hand.

Mixing by hand shall be done on a smooth water-tight platform. The sand and cement shall first be mixed dry until the whole mass is homogeneous and of perfectly even color throughout. Sufficient water shall then be added to make flowing mortar. In the process of making the mortar the materials shall be turned over at least five times. If concrete is to be made the crushed stone or gravel shall then be added and the whole mass turned over at least four times and until it has become homogeneous and of even color and consistency.

Mixing by machine shall produce a homogeneous mass of concrete perfectly uniform in color and even in consistency, and the whole mass shall be in continuous motion within the machine for a period of not less than one minute.

The re-mixing or re-tempering of mortar or concrete which has partly set shall not be permitted.

The general consistency of the mortar or concrete shall be such that the mass will flow readily in the forms, and that it can be conveyed from the mixer to the forms without separation of the ingredients.

The temperature of the mixture on completion of the mixing shall not be less than 40° Fahrenheit The crushed stone or gravel shall be heated artificially, if necessary, to obtain this result. In no case shall crystals of ice either in the sand or in the crushed stone be permitted to reach the mixing platform or the mixing machine.

51. Placing above Water.

The surface on which concrete is to be deposited shall be specially cleaned for the purpose. If the surface be rock it shall be given a coat of grout composed of equal parts of cement and sand well brushed into the surface and all the crevices. If the surface, vertical or otherwise, be of concrete which has set hard it shall be spalled or roughened and afterwards thoroughly brushed over with grout composed of equal parts of cement and sand. If the surface be of concrete which has not set hard the spalling or roughness may be omitted, but grout composed of equal parts of cement and sand shall be applied as specified above.

Mortar and concrete shall be placed immediately after being mixed.

Mortar or concrete which has partly set shall not be used.

Concrete shall be deposited in such a manner that the ingredients will not be separated, and the mass shall be consolidated by being worked after placing. The coarser ingredients shall be removed from contact with the formwork by the manipulation of a special tool.

The depositing of concrete at expansion joints shall be done with the same care and attention as that required to ensure a smooth finish to exposed surfaces.

In all cases laitance which may have formed on the surface of deposited concrete shall be carefully and entirely removed.

Concrete shall be deposited in approximately horizontal masses, and the work shall be stopped only at regular or temporary vertical bulkheads.

During freezing weather concrete shall be taken from the mixer and deposited in the forms so that no part of it shall be frozen and the temperature of the mass when deposited shall not be less than 35° Fahrenheit. The concrete shall be prevented from freezing until setting has taken place and until the process of hardening has begun.

Trowelled or floated horizontal surfaces shall be not less than one inch in thickness. They shall be composed of mortar or concrete proportioned according to the requirements for wear. The mortar shall contain at least one part of cement to two parts of sand. The concrete shall contain at least one part of cement to one part of sand and one part of finely crushed rock or gravel.

If possible the surfacing shall be applied immediately after the placing of the mass concrete, but when this is impracticable, the mass concrete shall be thoroughly washed and treated with a coat of grout composed of equal parts of cement and sand thoroughly brushed in before the surfacing is applied. In trowelling or floating the surface pure cement shall not be used.

52. Curing.

Concrete shall be protected from the direct rays of the sun for at least three days after being deposited when the maximum temperature is above 60° Fahrenheit in the sun.

For a period of seven days after being deposited concrete shall be kept moistened when the maximum temperature in the shade is above 60° Fahrenheit.

53. Form Removal.

The forms shall not be removed from concrete work until the concrete is safely self-supporting, and, where additional concrete is to be added, until it has sufficient strength to safely sustain the superimposed load.

54. Placing under Water.

When concrete is to be deposited under water the site shall be cleaned from all foreign matter and all currents of water shall be eliminated. The concrete shall be deposited immediately after mixing in such a way as to displace the water and at the same time to obviate the separation of the ingredients. The work shall be carried on in such a manner as to prevent the formation of laitance between successive masses of concrete.

Reinforced Concrete

55. General.

All the requirements of the preceding sections shall apply to reinforced concrete as far as consistent.

56. Crushed Stone and Gravel.

The largest fragments of crushed stone or pieces of gravel for reinforced concrete shall be of such a size as to pass through a circular hole ¾" in diameter in a thin plate.

57. Storage of Steel.

Steel shall be stored on skids clear of the ground and protected from rain and snow.

58. Fabrication and Placing of Steel Reinforcing.

All steel reinforcing shall be fabricated and placed in strict conformity with the dimensions on the approved drawings, and it shall be truly lined up and so held in position that displacement shall not occur during the depositing or manipulation of the concrete. All bars shall be free from bonds not specifically required by the approved drawings.

No material shall be permitted to adhere to the surface of the steel reinforcing until the concrete in which it is to be embedded is being deposited.

59. Cleaning of Form Work.

Immediately before depositing the concrete the form work shall be entirely cleaned of all foreign material preferably by the use of a pressure hose and nozzle discharging water, steam or air.

In column forms an opening shall be provided at the bottom of the form work of every column in order that every particle of foreign material may be readily removed.

60. Depositing of Concrete.

The concrete shall be deposited in small quantities preferably as a uniform stream. It shall be manipulated in such a manner as to ensure perfect adhesion to the entire surface of the steel reinforcing and to remove all impounded water or air.

In depositing concrete in columns the work shall be discontinued at the elevation of the bottom of beams for a period of not less than three hours before depositing the beam concrete. In the absence of beams the elevation of the bottom of the slab shall be taken as the stopping plane. Before commencing the depositing of the beam concrete (or slab concrete in beamless systems) every column shall be examined for laitance, which if present shall be immediately removed.

The concrete for slabs shall be deposited continuously with the beams. Special care shall be exercised to procure perfect homogeneity of tee-beam construction.

61. Discontinuance of Work.

Every structural element shall be completed without discontinuance if practicable. Unless completed in one operation, beams and slabs shall be discontinued only by the use of vertical bulkheads placed at the section of maximum bending moment.

62. Freezing Weather.

In protecting reinforced concrete from frost a system which will drive the moisture out of the concrete shall not be used.

63. Form Removal.

The forms shall not be removed until the times named in the following table have elapsed after depositing concrete, not counting periods in which the temperature has been below 35° Fahrenheit.

Part	Minimum number of 24-hour days elapsed after depositing
Posts under beams and girders	20
Floor slab panels	10
Wall forms	2
Column forms	4
Sides of beams and girders	4
All other parts	10

Cinder Concrete

64. General.

All the requirements of the preceding sections shall apply to cinder concrete as far as consistent.

65. Storage of Cinders.

Cinders shall be stored on a site which has been cleaned free from vegetable and other foreign materials.

Reinforced Cinder Concrete

66. General.

All the requirements of the preceding sections shall apply to reinforced cinder concrete as far as consistent.

67. Size of Cinders.

The largest particles of cinders for reinforced cinder concrete shall pass through a circular hole $\frac{3}{4}''$ in diameter in a thin plate and none shall pass through a circular hole 1-8″ in diameter in a thin plate.

Rubble Concrete

68. Soundness of Boulders and Rock.

All boulders and pieces of rock shall be perfectly sound, impervious and durable.

69. Embedding Rubble.

All boulders and pieces of rock shall be thoroughly cleaned of foreign material and after being wetted they shall be either floated into the concrete matrix or placed upon a floating bed with full bearing, in which case the concrete, as it is being raised around them, shall be manipulated in a manner similar to that required for exposed faces of walls. The mortar in the concrete shall be made to adhere perfectly to every part of the surface of the boulders and rock.

TESTS AND INSPECTION

70. Tests of Materials.

All the materials should be systematically tested in accordance with the recognized rules of the art for each material. The results of the tests shall comply with the requirements of these specifications.

71. Field Tests of Concrete.

Tests shall be made on concrete and mortar as the work progresses to check the density of the mixtures and the rate of setting. The test pieces shall be cubes, rectangular prisms or cylinders, having a volume of about one-fourth of a cubic foot. They shall be poured from the regular run of the mortar or concrete as deposited, and be left to set under the same conditions as the material in the structure. There shall be two such test pieces made from each day's work. The test pieces shall be carefully examined before the form work is removed.

72. Test Loads on Floors.

Test loads may be applied to a floor at any time after sixty days from the hardening of the concrete, but they shall not exceed one and one-half times the live load for which the floor has been designed. If no permanent deformations result from such loading the test shall be considered satisfactory.

73. Inspection.

There shall be constant competent inspection throughout the whole of the work.

MODIFICATIONS AND CORRECTIONS BY COMMITTEE

January 13th, 1914

Section 7 first line, "Section 30" should read "Section 31."
Section 11, third line, Delete "composite."

Section 12, third line, Delete "composite."

Section 31, first line, Between "shall" and "have" add "preferably be made by the open hearth process and shall."

Section 31, second division, left hand column, Delete "Elastic Limit" and substitute "Yield Point."

Section 31, fourth division, Delete whole division and substitute the following:—

Cold Bend without Fracture, (t = thickness or diameter, d = inside diameter of bend).					
For bars where t is less than ¾"	180° flat	180° flat	180° d = 3t	180° d = 4t	180° d = 4t
For bars where t equals or is greater than ¾"	180° d = t	180° d = t	90° d = 3t	90° d = 4t	180° d = 3t

Section 32, fourth line, Delete "20 000" and substitute 16,000."

Section 36, third line. Place period after "cement" and delete remainder of sentence.

Section 37, Delete first sentence and substitute "In building construction one mixture shall be used for the columns throughout the same story."

Third line, Place period after "cement" and delete remainder of sentence.

Section 44, fifth line, Delete "forty" and substitute "thirty."

Section 46, seventh line, Between "A" and "coating" insert "thin, even."

Section 50, seventh and eighth lines. Delete "If concrete is to be made the" and substitute "If concrete is to be made, wetted."

Section 50, twelfth line, Delete "and" after "consistency."

Section 50, fourteenth line, Change period to comma after "minute" and add "and the entire batch shall be discharged before any further materials are placed in the machine."

Section 50, twenty-first line, Between "the" and "crushed" insert "water, sand and."

Section 50, twenty-second line, Delete "artificially."

Section 51, twelfth line, Between "be" and "deposited" insert "conveyed in water-tight carriers and be."

Section 51, after seventh paragraph insert two paragraphs as follows:—

"Arch rings shall be built in sections of such length as will permit of all concrete in any one section being placed without stopping. If circumstances render this impracticable, bulkheads shall be placed normal to the line of pressure.

"In building bench walls or abutments of arches the tops of such walls shall be finished normal to the line of pressure, and no horizontal joints shall be made."

REPORT OF SEWAGE DISPOSAL COMMITTEE

820 New Birks Building,
4th June, 1913.

Prof. C. H. McLeod,
Secretary, Canadian Society Civil Engineers,
Mansfield Street, City.

Dear Sir,—

The Committee appointed by the Council, as set forth in your letter of the 14th of March last, to suggest names for the formation of a Committee on Sewage Disposal, and also to outline the duties of such a Committee, beg to report as follows:—

In view of the fact that a Committee on Sewage Disposal, of three years standing, has fully considered the subject and made a report thereon, which report was received at the last Annual Meeting of the Society, and also in view of the fact that since the date of your letter of instructions, a Committee has been appointed by the Council to represent the Society in co-operating with the Committee of the House of Commons in dealing with the same subject and in formulating legislation thereon, we are of the opinion that the appointment of any other committee is unnecessary until after the enactment of the proposed legislation.

Yours truly,
WILLIS CHIPMAN,
JOHN KENNEDY,
R. S. LEA.

Supplementary Report of Sewage Disposal Committee

On the invitation of Mr. George Bradbury, M.P., Chairman of the Committee of the House of Commons on the Pollution of Navigable Streams, Messrs. John Kennedy and R. S. Lea attended a Session of the Committee at the House of Commons, Ottawa, and gave evidence as to the problem in hand.

Professor C. H. McLeod, who was also present at the Committee meeting, testified as to the establishment of special courses in the universities on sanitation and allied problems.

R. S. LEA,
Chairman.

REPORT OF THE CONSERVATION COMMITTEE

In March last, the Chairman of the Committee on Conservation addressed a circular letter to the members of the Committee. Replies were received from a number of the members and are appended to this report.

Last year the Committee presented a report respecting Mr. Sauder's recommendation that the Society "urge strongly upon the Dominion Government the importance of making the necessary appropriations and providing the necessary staff to undertake in an intelligent manner the gauging of all streams of water supply and the location and survey of all sites suitable for reservoirs for the storage of water.

The Committee, in its report, enumerated briefly the requirements for adequate gauging of streams, the principal gauging operations that have been carried on in Canada, and its importance in connection with all water power developments. The collation and subsequent publication of all available data was strongly recommended.

On April 14th the Secretary wrote that Council were of the opinion that the Commission of Conservation should undertake the work of compiling and publishing the stream data above referred to. The pressure of other work did not, at the time, permit the staff of the Commission to undertake the work, but it is hoped that it will be commenced next spring and that all engineers will co-operate by supplying all available information.

The communication of Mr. R. O. Sweezey, Montreal, is as follows:—

"In so much as I am supposed to represent Northern Quebec on this Committee, I prefer to confine my suggestions for discussion to questions affecting that part of the country.

"Water Powers.—While I quite realize that the water powers of Quebec are under Provincial control I think that nevertheless the local government is open to receive recommendations from this body.

"Immediately north of the city of Quebec is an area of some 3,000 square miles set apart as a game reserve and known as the Laurentides National Park. This area lies between the waters of the Saguenay and St. Lawrence and comprises the headquarters of a number of important streams including the Jacques-Cartier (drainage area 1,100 square miles), St. Anne de Beaupre (350 square miles), Batiscan and several others.

"In connection with the development of Seven Falls on the St. Anne River under a head of 430 feet, a minimum development of about

6,000 horse power is possible. The head waters of this river offer excellent opportunities for storage, which would increase the minimum available power to at least 12,000 horse power. But here the difficulty arises which seems diametrically opposed to ideas of conservation. The National Park authorities stubbornly resist any move to create storage within the Park, claiming damage to game by flooding areas and thus disturbing caribou, moose, etc. It is hard to understand such arguments when it is a well known fact that the beavers which are so plentiful in this park, do a great deal more damage by flooding than any possible engineering storage could do, yet no effort is made to remedy that evil. Moreover, the important storage localities to be flooded are usually in deep valleys and burnt areas where the flooded areas are absolutely valueless. Considering that the city of Quebec is greatly retarded in its manufacturing growth by the lack of cheap power (steam power is now used for city lighting), and, further, in view of the fact that the tract of 3,000 square miles thus reserved is, apart from the timber rights, quite unproductive an area owing to its rough and mountainous nature, one of the least benefits that might be expected from it is the utilization of its natural value as a storage basin for augmenting its water powers.

"There seems to be a strong tendency, both in Dominion and Provincial forest park regulations, to forbid the establishing of artificial storage within park limits. I would like very much to hear any arguments which might be offered in defence of such a policy.

"INDIANS.—As a natural resource the Indians of Northern Quebec and Northern Ontario are important. They are fast dying off and no effort is being made to alleviate their sufferings or to provide means for their livelihood. In this connection I have recently written to the Rt. Hon. R. L. Borden. Copies of this correspondence are attached hereto.

"I should very much like to have a discussion of this subject by the members of this Committee.

"Montreal, February 14th, 1913.

"The Right Hon. R. L. Borden,
Ottawa, Ont.

"Sir,—

I must apologize for presuming to ask your attention for a few moments at a time when you are so busy with affairs of state.

"Friends have so often urged me to write up for publication the facts on which I herein wish to respectfully call your attention, that I have resolved to take this more direct method of calling the attention of the proper authorities to one of the saddest spectacles of poverty, disease and suffering that has ever been charged to the neglect of a nation.

"I refer to our North American Indian, especially to the handful of starving victims of our lust for conquest who to-day are in such a state of horrible suffering that I cannot hope to make anyone believe more than a small portion of the truth.

"For seven years, my duties as a civil and mining engineer have taken me into every part of Northern Quebec and part of Ontario where I have had opportunities of observing the deplorable state of the Indians. Many others have seen the same conditions which I wish in a small measure to portray, but familiarity with these features tends to create an indifferent attitude on the part of explorers, who usually recover from the first shocks of the conditions they become acquainted with and, one after another, while admitting the sad fact that Canada is cruelly grinding the life out of the once noble North American Indian, agrees that it is but a matter of time till they are extinct anyway.

"I have spent months at a time in our Quebec hinterland where my acquaintance with these conditions enables me to speak with authority on this subject. There are but a few hundred Indians in the whole Province, but they are nearly all stricken with tubercular diseases and other vile infections contracted from immoral vagabonds who so often are members of Government survey parties.

"Consider the ravages of these awful diseases in a race whose blood until recently never knew such infections. All that medical science can command will not cure these diseases in the white race which has for centuries gone through a process of elimination of the unfit to survive. Can you picture then the conditions that must prevail among these poor wretches who are constantly driven backward into a forest, which is gradually offering less and less food. In many localities even the hardiest hunter cannot eke out a living on the depleted game resources, yet I have known and have seen whole families, not one of whom was in good health and several in the last stages of consumption, entirely dependent on the superhuman efforts of one or two women or children.

"On one occasion, two hundred miles from civilization, I met a poor starving party of Indians all huddled together under two badly torn and battered shelters. It was the month of February and the thermometer registered 22° below zero. In one old rag of a tent with branches and snow piled around for shelter there lay two young Indians, about 30 years of age, at the point of death. One of them in his own language asked if I would not pray my good King to send them aid. The poor fellow died two weeks later. His bowels were literally visible through his ragged sores. Tubercular ulceration, which was his awful disease, has claimed many other victims besides these poor wretches who have not the simplest medical aid or remedy of any kind to apply. The other Indian died a few weeks later.

"All that winter these two men were looked after by two sick women and one little girl 12 years old, while four younger children had to be fed. They had no flour, only fish which they caught through the ice; and a few hare and muskrat was all they had to eat when I found them. The women cried to me for help, while the children piteously devoured the frozen pork which my men gave them.

"But, Sir, this is not an exceptional case. I could tell you of dozens of such heartrending scenes. On another occasion while hurrying over the cold snows heading a line of men pulling my provision sleighs, I came across fresh tiny snowshoe tracks. It was growing dark, so I decided to catch up with the little Indian. I soon saw a frightened little girl about 12 or 13 years old, but when I called to her in Indian she halted until I came up. I learned that she had been out to examine her traps but found nothing. Her father had died early in the fall and she and her mother lived with two of her younger brothers in a wigwam nearby—and such an abode! The poor mother was herself well advanced in consumption. She had just returned from a lake about half a mile away where she was successful in catching a two pound white fish in a net which she had set through the ice. She asked me to exchange the fish for some flour as they had tasted none for a long time. Needless to say, I gave her all I could, including blankets and fire arms. Another time one of my men found a woman who had died while crossing a frozen lake to seek help after the death of her husband.

"Such are some of the conditions which these poor Indians must face. I have not exaggerated in the least, but could give you several examples of more awful conditions.

"Why should a country like ours allow such terrible suffering on the part of a few simple and kind hearted souls to whom we owe so much as the original owners of our land?

"Canada has assisted in relieving foreign distress by hundred thousand dollar subscriptions—as witness San Francisco, Messina, etc.—but, sad to state, she has entirely ignored her duty towards these poor Indians.

"Something surely should be done to relieve them. Medical stations and provision depots could be established at a cost insignificant compared to the great good to be done. We may well wonder why those who have laid the foundations of enormous wealth at the Indians' expense have not ere this come forward with some form of relief, knowing the conditions as they must.

"I venture to say that not one man in Canada would oppose a movement to help these poor wretches. Certainly anyone to whom I have mentioned some of these facts were most emphatic in their denunciation of our indifference and uncharitableness toward these poor unfortunate fellow beings.

"Should you wish to have further and more convincing particulars in regard to the foregoing, I shall always be glad to be of service, and do anything in my power to further a movement of relief. I can also refer you to well known engineers who are acquainted with some of the conditions I have endeavored to portray.

"Trusting that you may give this your kind and human consideration

I am Sir,

Yours very respectfully,

(signed) R. O. SWEEZEY.

Montreal, March 13, 1913.

"Hon. T. W. Crothers, Minister of Labour,
House of Commons,
Ottawa.

"Sir,—

"During the past three or four years the plea for the conservation of natural resources in Canada has been so successfully presented that few people remain unconvinced of the wisdom of such conservation efforts if properly directed.

"In all the eloquent and logical arguments for conserving our forests, water powers, game and other assets of rugged nature, I have not heard of one plea on behalf of the Indians, who, as I have already attempted to show, are rapidly dying off unnoticed by even the most enthusiastic champions of our natural resources. It is strange that no thought of the sometime lords of these vast resources has entered our minds, for surely the Indian is a natural resource just as important as our wild animals, which time and again laws and regulations are enacted to preserve.

"In the years when this country was unknown to the white race, the conservation of natural resources was maintained to the high efficiency in which we found them. This efficiency of conservation was due to the care of the Indians who realized the extent to which their food and shelter depended upon the maintenance of the forests and wild animals. In this regard their instinctive tendencies to preserve the forests in Northern Quebec and Ontario are as strong to-day as ever they were, and indeed I have many times discussed with them the calamitous effects of the white man's carelessness in regard to fire and I have found them deploring such losses, as becomes them much more than the most enlightened of us. Now it is in this connection that the Indian himself, the chief natural resource of the hinterland, may be employed to guard the forests and game of the country. That the majority have not enough to live on is more than evident, but give them a small remuneration and I cannot too emphatically express my contention that two Indians with instructions to report at stated intervals to officers of the Government can patrol and efficiently guard more territory than any four white men. In this matter I have made careful observations, as I have employed many Indians and white men in the wilds and feel that I am justified in my statements. I made this suggestion incidentally some three or four years ago in writing on "Quebec's Natural Resources" for the "Pulp and Paper Magazine of Canada." About a year ago I was pleased to note that a certain Bishop from a northern mission made the very same suggestion at the meeting of the Canadian Forestry Association.

"In going through the north country, and particularly in Quebec's hinterland, I was so impressed by the conditions of which I gave a few examples in my communication of the 15th of February to the Rt. Hon. Mr. Borden, that I at once realized the most effective relief which could

be given those poor sufferers would be found by establishing a few hospital depots under the supervision of medical men, who would be assisted by Indians both men and women when necessary. There are many widows among the Indians and such women would be excellent help at hospital depots if properly instructed.

"I need not point out how many ill and starving creatures would seek refuge and treatment in such depots, for in my former communication I have attempted to deal with this.

"Two or three hospital depots might be placed far into the interior on the Ontario side and as many more on the Quebec side. In each case a suitable site could be chosen on some large lake and one or two could be established on James Bay, but in every case these hospital depots should be at least 30 miles removed from the Transcontinental Railway and other civilization influences.

"In conjunction with these proposed hospital depots, a fairly large supply of staple provisions could be stored in the fall in order to take care of needy cases in winter time when death or illness might overtake the heads of families.

"I believe that, with the judicious expenditure of a few thousand dollars annually, these Indians or those of them who are in health can be made self-supporting in patrolling the various canoe routes as fire rangers. The wages they would earn in this manner could be paid them during the following winter in the form of supplies and clothing. As for those who are ill and dying, of course nothing can be expected from them, as they obviously become charges of the country.

"These are only a few brief suggestions, for this matter requires considerable thought and careful planning. The main thing, however, is to make a start in providing relief and, if the matter is put into the hands of the right kind of person with medical training and sympathetic culture, I have no doubt that a most efficient and satisfactory system can be evolved.

"Please be assured of my constant interest in this matter and do not hesitate to demand any assistance which you think I may be able to give from time to time. Anything I can do to assist you shall always be done freely.

"Yours faithfully,
(Signed) R. O. SWEEZEY."

Mr. W. H. Breithaupt, Berlin, Ont., has made a special study of flood conditions on the Grand River, Ont. He has promised a fuller report at a later date, but in the meantime has contributed the following:

WATER CONSERVATION

Control of the Grand River, Ontario

"In the way of preliminary investigation of the economic practicability of control of the flow of the Grand River, Ontario Peninsula, by means of storage, sufficient in volume to impound a large proportion of flood flow, and thus prevent excessive floods and give a well sustained flow in the low yield periods, the Hydro-Electric Power Commission has during the past month carried on, and is still continuing, a survey and various investigations throughout the river valley. A lineal survey from outlet to headwaters, establishing of bench marks with elevations and distances from outlet of the river, flow gaugings, and topographical delimitations of possible storage basins, have been the lines of work. Investigation of the basin in Pilkington township on the main river remains to be completed, and a satisfactory site for a sufficient reservoir on the Conestoga tributary, which empties into the main river a short distance below Pilkington township, remains to be found.

"The unfinished present stage of this work has prevented any conclusion being reached as yet. It is hoped that for a later report information that has long been wanted will be available.

"The various cities, towns and smaller communities in the drainage area of the river have made large growth during the past year. To many of them, flood diminution and sustained flow of the river are of vital importance. The spring flood this year was again very high, only slightly under the record flood of 1912, and did much damage along the entire course of the river.

"The rapidly growing manufacturing town of Galt on the river made an extended investigation during the past summer with a view to enabling passage of flood waters without local damage. The river channel is narrowed by encroaching buildings, and obstructed by piers of short span bridges and by small boulders and detritus on the bottom and along the sides. A plan for a smooth, well defined and unobstructed channel was prepared, but for various reasons no action has yet been taken."

Mr. A. E. Doucet, Quebec, writes as follows:

"I am sorry to say that I have not been able to devote very much time to look into possible suggestions for inclusion in the annual report of the Committee. As a railroad man, however, and familiar with the operation of railways through timber country, I am more than ever convinced that our generally accepted width of 100 feet for right of way is very much too limited. I know that this point has already been brought up before the Committee, but it seems to me that in future the right of way through bush lands should certainly not be less than 200 feet, and a law should be passed to this effect for all future construction work.

Mr. J. B. Challies, Ottawa, has contributed a very interesting memorandum respecting the proposed forest reserve in the basin of the Winnipeg River. He says:—

"In response to your request this morning for my views regarding the work of the Conservation Committee of the Canadian Society of Civil Engineers, I would submit the following:

"Engineers both in the Government Service and in private practice have for many years been seriously handicapped in their endeavour to secure quick and authentic information respecting the results of surveys, investigations, etc. of the different departments of the Dominion Government and of the several Provincial Governments, by the lack of some central office to which enquiries could be addressed. The situation in the United States has been partially met by the creation of an office for the distribution of public documents issued by the various departments of the United States Government, and a monthly catalogue issued by the Superintendent of Documents. A similar office would meet the situation here.

"The question of the adverse effect on stream flow of the denudation of forest cover is probably one of the most important matters occupying the attention of engineers interested in water power, irrigation, water supply, navigation, or any other activity depending upon water. Not only must the question be considered from a remedial point of view but also with a view to preventing existing forest cover at the headwaters of important streams from being burnt or improvidently logged.

"The particular situation in which I am officially interested is that in connection with the water powers of the Winnipeg River. The headwaters of this river are in the province of Ontario, and include the Lake of the Woods district. Fortunately this district abounds in large lake areas suitable for storage purposes and the land areas are, so far as I am able to learn, fairly well covered with forest growth. Owing to the location of this forest cover in close proximity to the prairie country, it has already become a prey to the unscientific lumberman, and it is only a matter of time until the commercial timber will be removed. Unless the lumbering operations are properly supervised and restricted and reforestation provided for, the present facilities that this district offers for storage and conservation of run-off will be dissipated.

"I am not aware that there is at the present time any forest reserve in the vicinity of the Lake of the Woods district, and am convinced that it would be in the best interest if the whole area were placed in a forest reserve in order that all logging operations may be under strict supervision of trained foresters, and also that adequate reforestation may be arranged for. Recommendations from the Conservation Committee of the Canadian Society of Civil Engineers to the proper authorities that such a reserve be created in the interest of the maximum advantageous use of the water resources flowing through and from the Lake of the Woods would surely be a matter worthy of consideration.

"There has been considerable discussion by the Conservation Committee regarding co-ordination or co-relation of the different hydrographic survey organizations of the various departments of the Dominion Service, and also of the Provincial Services. While the matter of internal organization of the hydrographic survey propaganda in Canada might not be one for the attention of the Committee, I do think the Committee might very well consider the advisability of recommending some systematic method of making the results of the various hydrographic survey organizations available to the public quickly and uniformly. My own opinion is that this could best be done by having one representative from each Department of the Dominion Government connected with the hydrographic survey work (a member of the Society) placed on a sub-committee of the Conservation Committee, with a view to giving this question special consideration."

Mr. A. J. McPherson, Regina, suggested the following matters and has promised a report thereon at a later date:

1. The development of methods of treating the large resources in the way of lignite scattered throughout Saskatchewan to make it more serviceable for the use of the people of the Province.

2. The collection and provision for industrial and commercial purposes of the sources of water supply in sections of the Province where the local supplies are shown to be becoming inadequate.

3. The development of the highways of the Province and the direction of the forces making for this so as to produce the largest results for the efforts expended.

4. The reclamation of various areas throughout the Province by drainage.

Mr. McPherson also enclosed an interesting report by Mr. R. O. Wynne-Roberts which deserves wide circulation as a very practical measure of conservation.*

Mr. C. E. W. Dodwell, Halifax, refers to a number of important matters as follows:—

"There is one very important matter that no doubt has engaged the attention not only of our Committee of the C. S. C. E. but the Commission of Conservation, of which you are Assistant Chairman; also I am aware that the Federal Government has done and is doing something in the matter, though I regret to say I have no definite knowledge and no official reports or blue books describing the work done or progress made. I refer to the question of forestation, of which the importance is hard to over-estimate.

*Note.—Mr. Wynne-Roberts' paper is entitled "The Utilisation of the Coal Deposits of Saskatchewan." This report is published by the Government of Saskatchewan, and copies of the same may be obtained by those interested on application to Mr. A. J. McPherson, Chairman, Highway Commission, Regina, Sask.

"If our C. S. C. E. Committee is not already in possession of full information in regard to the notable work that has been accomplished in Germany in forestation, I would suggest that steps be taken immediately to secure such information, with a view to the perfecting of a Forestry Bureau in Canada on similar lines. No doubt you are aware that forestry in Germany is a source of considerable revenue.

"In view of the rate at which timber is being used and our forests depleted, we should have thoroughly efficient and energetic forestry bureaus at work in every Province of the Dominion.

"I know that the Forestry Bureau of the United States Government at Washington is doing good work in the dissemination of literature and information in regard to forestry, and some months ago I obtained from the Forestry Office in Boston a number of interesting pamphlets on the subject.

"One very interesting feature of the question is the influence of forestation upon the climate of our North West. The whole matter is one of such great importance and interest that I feel under no obligation to apologise for mentioning it, though perhaps I should do so for my ignorance of what has been and is being done by the Federal Government.

"There is another important matter, that, so far as I am aware, has not engaged the attention of the Government and which certainly ought to do so.

"I dare say you often use alcohol in your domestic economy, for the purpose of making coffee or heating a chafing dish etc., and that you send to the druggist and pay 25 cents for about a pint or less of so-called methylated spirits, which when burning is often so evil smelling as to be almost unusable.

"In the United States and I believe in most other civilized countries, denatured alcohol can be bought for about 50 cents per gallon, and it is coming into very general use for domestic cooking and heating purposes, and also for the production of power. There is a concern in New York called I think, the Alcohol Utilities Company, which makes all kinds of utensils for the use of alcohol in cooking and heating as well as lamps for lighting purposes. The lamps are, of course of the incandescent mantle type, and they are made of all powers, ranging from about 10 to about 500 c.p. the higher power lamps being, as they claim, very much cheaper in operation than electric lamps. I went through the place about a year ago and was amazed at the variety, simplicity and usefulness of the many utensils seen. Denatured alcohol in the United States is in fact a tremendous boon to the people, and I was told that some four or five immense distilleries in the United States, which, a few years ago were turning out whisky, are now confining their operations exclusively to the production of denatured alcohol, showing that, besides being a tremendous boon to

the people, it is a profitable industry and no doubt one capable of very considerable expansion. Such an industry would, I think, be fully as suitable to Canada as it is to the United States, and there is no question whatever that it would be as great a boon here as it is proving to be in the States.

"I have discussed this matter with one or two Members of Parliament, who were all very favourably impressed with it, and they agreed with me that it was a matter that might very properly and profitably be taken up by the Government. My first suggestion would be that in any tariff revision that may come before the Government in the near future, the duty should be removed in whole or part from denatured alcohol for domestic, industrial or power purposes, and that encouragement in some way be given to the home production of this valuable article.

"If the Committee deem this matter worth an investigation I shall be glad to do what I can in procuring available information, so that we may be able at an early date to make it the subject of a report that will command the attention and interest of the Government and the people.

"Another matter of minor importance to the above has occurred to me as capable of development. There are in the country to-day many thousands of tons of sawdust lying in huge heaps at and around saw mills and up to the present time almost absolutely useless. It seems to me that some use should be found for this material. For instance, it might be mixed with a small proportion of some adhesive combustible substance, such as coal tar, crude oil or the refuse from oil distilleries, and compressed into briquettes for fuel; possibly some process might be discovered by which it could be converted into paper, but at any rate it might be given some value."

COMMITTEE ON CONSERVATION.

James White, Chairman
G. A. Bayne
W. H. Breithaupt
E. E. Brydone-Jack
H. J. Cambie
J. B. Challies
John Chalmers
C. R. Coutlee
J. S. Dennis
C. E. W. Dodwell
A. E. Doucet
J. B. Hegan
M. G. Henniger
H. F. Laurence
R. S. Lea
R. W. Leonard
A. J. McPherson
R. McColl
W. McNab
C. H. Mitchell
W. R. W. Parsons
E. T. P. Shewen
R. O. Sweezey
T. H. Tracy

REPORT OF COMMITTEE ON ESTABLISHMENT OF TESTING LABORATORIES

Ottawa, Ont., Jan. 13th, 1914.

The President and Members,
Canadian Society of Civil Engineers.

Gentlemen,—

I beg to submit the following report of the Committee on Establishment of Testing Laboratories, on behalf of the Members of our Committee: Professor J. Galbraith, Past President; Professor H. M. Mackay, Professor Peter Gillespie, and Messrs. Phelps Johnson, President; J. A. Jamieson, A. St. Laurent, Geo. E. Perley, J. B. McRae, and C. H. Keefer.

As the establishment of a Government Testing Laboratory is in the hands of the Government there is little that we have been able to do, except to urge its necessity both for the Government and the public.

The Minister of Public Works, the Hon. Robert Rogers, has been interviewed and written to, and asked to place an appropriation in the estimates for testing laboratories. I wrote him, for the Committee, that the definite information acquired through testing laboratories for the use of all the Government Departments interested in Canadian structural materials would be of great practical as well as scientific value, and that should the Government follow the example in this respect of other countries, it could not fail to ultimately add to Canadian prestige in keeping abreast of the times. In answer to this letter the Hon. Robert Rogers writes, "I will be glad to do whatever I can in the matter to which you refer."

The Deputy Minister of Public Works has also been interviewed and expressed himself in sympathy with our recommendations.

Our Committee recommends that, as the establishment of a Government testing laboratory is a matter depending solely on the action the Government may see fit to take, this Committee might for the present be discontinued; but we would also strongly recommend, should this action be taken, that the Council should keep the matter before the Government by writing frequently to the Minister of Public Works, drawing attention to the importance to the country, as well as the Government, of a laboratory such as they alone would be in a position to equip and maintain, and when definite action is taken by the Government that a Committee be again appointed to assist the Government in any way desirable, should they wish the co-operation of our National Society.

Respectfully submitted,

C. H. KEEFER,
Chairman.

REPORT OF BOARD OF EXAMINERS

Jany. 6th, 1914.

Examinations were held in May and November. The results are summarized in the following table:—

Subject	Number of candidates presenting themselves	Passed	Failed
Theory and Practice of Engineering.....	11	6	5
Railway Engineering.....	10	7	3
Municipal Engineering.....	5	5	0
Total.....	26	18	8

The candidates rejected were as a rule so deficient in a knowledge of the principles underlying sound engineering practice that it was impossible to regard them as qualified to "design as well as direct engineering works." The admission of such candidates, probable enough in the absence of examinations, would in the opinion of the Board, tend to lower the standing of the Society.

The Board also examined and passed upon a large number of educational certificates presented by candidates claiming exemption in whole or in part from the scheduled examinations. As these certificates emanate from a great variety of institutions, their consistent appraisal is difficult. The Board has also felt somewhat embarrassed by the lack of clear definition of its duties as compared with those of the Education Committee in respect to this work. It is felt that in order to secure the best results, the examination of certificates should be in the hands of a single body, preferably distinct from the Examining Board.

H. M. MACKAY,
Chairman.

Arthur Surveyer,
Secretary.

Mr. Francis

Mr. W. J. Francis presented the Report of the Committee on Reinforced Concrete in the following resolution, moved by himself and seconded by Mr. C. M. Morssen, that the draft report as submitted be received, that the discussion thereon be submitted to the Committee with instructions to report to the Council, and that the Committee be continued until the next Annual Meeting with instructions to make a final report.

Mr. Brown

Mr. F. B. Brown suggested an amendment to the motion if acceptable to the proposer, namely, that the Committee confer with similar Committees of other engineering societies, especially with the American Society of Civil Engineers and the British Institution of Civil Engineers, with the idea of unifying the work on the subject and thus obtaining the best results.

Mr. Francis

Mr. W. J. Francis replied that he would have pleasure in including Mr. Brown's suggestion in his motion if it were practicable to carry out the proposal. The Committee had, however, made extensive use of the reports of other Societies which had been engaged on the same work. The symbols generally employed had been adopted and everything possible had been done to make their work conform with what was done elsewhere. Not only had the work of the Institution of Civil Engineers been taken into consideration but also that of the national societies of France, Germany, Austria and Switzerland. If co-operation were carried on to the fullest extent with other societies it would be impossible to complete a report for many years. It must be remembered that there is a great deal of difference between the conditions of many of the national societies and our own. They have a great deal of money at their disposal and we have none. The report, he thought, was in conformity with the instructions of the last Annual Meeting, which were to present a draft for discussion. If the Committee is instructed to continue its labours, it is proposed that Mr. Morssen would, with the consent of those in charge of the McGill University laboratories, make a special series of tests on reinforced beams.

Mr. Elmont

Mr. V. J. Elmont presented a written discussion on the subject of reinforced concrete, which discussion was ordered to be submitted to the Committee for its consideration.

Mr. Lawrence

Mr. W. D. Lawrence advised that this specification should be discussed at a meeting in Montreal and that the discussion should be turned over to the Committee in order that they might, if they saw fit, adopt any recommendations made on the discussion. The report should, in his opinion, only be adopted after a discussion by the membership at large and revision by the Committee.

Mr. Irving

Mr. T. C. Irving, Jr., asked that the Branches should have an opportunity for discussion of the proposed specification before its adoption.

The motion by Mr. Francis, seconded by Mr. Morssen, was then put to the meeting and adopted, it being understood that when the report was presented to Council such action as to printing the report in final form might be taken as might seem best under the circumstances.

The President

On the recommendation of the President action in regard to the report on Sewage Disposal was deferred, in view of the fact that there were no members of the Committee present.

The report of the Committee on Testing Laboratories was considered, and after discussion it was resolved on motion by Mr. C. H. Rust, seconded by Mr. S. P. Brown, that this Committee be discontinued and

that the matter of further representations to the Government in connection with the establishment of laboratories be referred to the Council.

Mr. H. M. MacKay, as Chairman of the Board of Examiners, reported that the Committee had advised reducing the number of examination periods, and that the proposal having been approved by the Council two sets of examinations only were held during the past year, one in May and the other in November. The greater number of the candidates who were examined came up in the professional subjects. Of these somewhat over 60 per cent had passed and the remainder were advised that after further study they should repeat the test. In the preliminary subjects there were only two candidates, this small number no doubt being due to the fact that our Students generally are university undergraduates and that the transfer from the grade of Student to that of Junior did not call for any additional examination. Mr. MacKay reported that the standard so far adopted in the examinations had not been very severe, that the candidates were given every opportunity possible to qualify under the by-laws, the underlying idea of the examinations having been to ascertain whether candidates were qualified to design and construct engineering work. Certificates of admission to the grade of Associate Member in the Institution of Civil Engineers, in which Institution similar examinations to our own are held, had been accepted as qualifying under the by-laws of the Society, and a considerable number of candidates had been admitted under these certificates. Mr. MacKay was of opinion that a conference between the Educational Committee of the Society and the Board of Examiners should take place at an early date in order that the question of jurisdiction in regard to the admission of candidates presenting educational certificates might be more clearly defined. He was of opinion that the responsibility for the latter should be entirely vested in the Educational Committee. Mr. MacKay

Mr. R. De L. French called the attention of the meeting to the desirability of drafting a set of general clauses for specifications, and moved that the Council appoint a Committee to consider the drafting of uniform general clauses in specifications and contracts which may be used by the profession in conjunction with specific clauses suited to the particular work in hand. In his opinion there was a wide field of usefulness for such a Committee and he believed that the study of the matter would prove of great benefit to engineers. Mr. French

Mr. French's motion was seconded by Mr. A. T. Tomlinson.

Mr. M. J. Butler said: "In the Province of Quebec the statutes protect the owner sufficiently whether covered by specifications or not. As you know the Province of Quebec throws upon the engineer, or architect, and the contractor, as the case may be, the full responsibility for any defect in a structure that may develop, within five or ten years. I forget Mr. Butler

the exact time.* I know in a case which came before the Privy Council, it was held that the contractor had the onus upon him of knowing latent defects in a foundation. In every state of the United States, except Louisiana, and every province in Canada, except Quebec, the common law prevails and the owner's interest must be protected by the contract and specifications, but in this Province the obligation is upon the contractor. I think it would be a help if some sort of a standard in regard to specifications and form of contract were in use."

Mr. Francis

Mr. Walter J. Francis remarked that it would be very difficult to make a comprehensive specification in all the trades with which an engineer had to deal. He had spent a very considerable amount of time on an attempt to do so but was not satisfied with the outcome. He thought, however, that it would be an excellent thing for a Committee to engage in the work of drafting such special clauses.

Mr. French

Mr. French stated that his experience had been that the absence of such general clauses had rendered the work of writing specifications unnecessarily onerous; that sometimes clauses were left out which should be inserted and at other times more matter than was really necessary found its way into specifications.

Mr. Mitchell

Mr. C. H. Mitchell was in favour of the matter being investigated but doubted the possibility of the Committee bringing in a satisfactory draft before the next Annual Meeting. Possibly a report from the Committee on the advisability of drafting such clauses would be all that should be expected, leaving the matter open for further discussion at the next Annual Meeting at which time any details suggested and the continuation of the Committee might be decided upon.

Mr. French

Mr. French concurred in this view, but was strongly of opinion that an effort should be made towards arriving at a satisfactory finding.

The motion, as proposed by Mr. French and seconded by Mr. Tomlinson, being put to the Meeting was carried.

Mr. Brown

Mr. S. P. Brown, Chief Engineer of the Canadian Northern Montreal Tunnel & Terminal Company, invited the members attending the Meeting to take a trip through the Mount Royal Tunnel, on Thursday afternoon, at 3 o'clock, and explained the arrangements which he would desire to make in connection with the trip. This kind invitation was accepted and the necessary notices in regard thereto ordered to be made.

The report of the Committee on Conservation was presented by Mr. James White, Chairman of the Committee. On motion the report was received.

Mr. Butler

In discussion of the report Mr. M. J. Butler pointed out that it was not desirable for this Society to make recommendations as to the policy of the Government with respect to the manufacture of alcohol and methylated

* Article 1688 Quebec Civil Code says—"If a building perish in whole or in part within ten years, from a defect in construction, or even from the unfavorable nature of the ground, the architect superintending the work and the builder are jointly and severally liable for the loss."

spirits, especially in view of the fact that the manufacture of alcohol from saw-dust has not yet been put on a successful commercial basis. He would, therefore, recommend that the report be amended in so far as this matter was referred to.

Mr. James White in reply stated that there was no objection to the deletion of this portion of the report, and moved that the report be adopted with the omission of pages 80 and 81. Mr. White

The motion being seconded by Mr. C. H. Mitchell, the report was adopted.

Mr. C. H. Mitchell then moved, seconded by Mr. T. C. Irving, Jr., "I. That this Society commends the work of investigation being done by the Hydro-Electric Commission of the Province of Ontario with respect to the control of the Grand River, and expresses the hope that the Commission will continue similar investigation through the Province. II. That the Council communicate this resolution to the Commission." Mr. Mitchell

Mr. A. A. Dion, in discussion, pointed out that the Hydro-Electric Commission being also engaged with private interests, it did not seem wise that the Society should adopt the resolution proposed by Mr. C. H. Mitchell. Mr. Dion

Mr. C. H. Mitchell stated that the work of the Commission was in accord with the policy of the Society. Mr. Mitchell

Mr. C. R. Coutlee said that it was difficult to make such a commendation, especially in view of the work done by the Government on the Ottawa River. Mr. Coutlee

Col. W. P. Anderson thought that a distinction could well be made between the Commission and its Commercial Undertakings and that the Society could unite in commending the scientific portion of the work. Col. Anderson

The motion being put to the Meeting was lost in division.

The Meeting then adjourned for luncheon.

At 1.30 p.m. a complimentary luncheon by the resident members to the visiting members was given at the Windsor Hotel and was attended by some two hundred persons.

Afternoon Session, Tuesday, January 27th, 1914

The Meeting reassembled at 3 p.m. The President, Mr. Phelps Johnson, in the Chair.

The President called the attention of the Meeting to the report of the Committee on Track, and wished to know if there were any members of the Committee present to read the report. In the absence of a representative, he recommended that the Council should select two out of the eight subjects named by the Committee for report and that in accordance with the recommendation of the Committee its membership should be increased from three to ten. The President

On motion the Committee was continued and the recommendations of the President unanimously adopted.

Mr. Chipman

Mr. W. Chipman presented the report of the Committee on Sewage Disposal, which report, at the request of Mr. Chipman, was read by the Secretary.

Col. Anderson

Col. W. P. Anderson moved that the report be adopted and the Committee be continued with power to increase its membership.

This motion was seconded by Mr. G. A. Mountain.

Mr. Leofred

In discussion of the report, Mr. F. X. A. Leofred said that the work of this Committee was becoming more important each year and the question of the demands to be met by the smaller towns was one which required a great deal of study. The financial obligation which might be imposed by any hasty legislation might well exceed the capacity of a small town and put it in the Bankruptcy Court. He was of opinion that the information at the present time before the Committee on Sewage Disposal appointed by the House of Commons was not adequate to represent all the conditions.

The motion being put to the Meeting was carried.

Col. Anderson

Col. W. P. Anderson, acting for the Chairman of the Committee on Improved Engineering Service, said that the Committee desired to approach the Government with the idea that the engineering service of the Dominion might be put on a more permanent basis and especially that the features of promotion and superannuation might be established in connection therewith. Unfortunately the larger portion of the engineering staff of the Dominion Government consisted of temporary employees. The Committee had made reports and discussed the matter with the late Government and had been promised that the question would be dealt with by the legislature. A change of Government had, however, necessitated the work being taken up anew. The present administration, especially the Minister of Public Works, had received the Committee very cordially and had promised that the matter would be considered in Parliament, but up to the present time nothing of a definite character had been accomplished. Col. Anderson thought it was especially desirable that the engineering service of the Government should be placed on a better footing.

Mr. Leofred

Mr. F. X. A. Leofred recommended that a delegation of the Society should go to Ottawa to present the matter formally to the Government.

On motion the Committee was continued.

Mr. Marceau

Mr. E. Marceau stated that the Committee on Educational Requirements had no special report to make but he recommended that the Committee be continued in order that it might co-operate with the Board of Examiners.

In accordance with the recommendation of the Chairman of the Committee, the motion being seconded, the Committee was continued with power to add to its membership.

On motion by Mr. G. H. Duggan, seconded by Mr. M. J. Butler, the Committee on Specifications for Steel Railway Bridges of Fixed Spans was continued with power to add to its membership.

Mr. G. A. Mountain, representing the Committee on Rails, said that Mr. Mountain
the Committee had done a good deal of work but was not yet prepared to make a final report. He recommended that the Committee be continued and that Messrs. M. J. Butler and A. F. Stewart be added to the Committee.

The motion, having been seconded by Mr. C. H. Ross, was carried.

Mr. C. H. Mitchell moved that a Committee on Cast Iron Water Mr. Mitchell
Pipes and Specials be appointed to revise the report of a similar Committee adopted some years ago. He moved that the Committee consist of the following:—Messrs. T. C. Irving, Jr., N. J. Ker, A. Currie, F. H. Pitcher, C. H. Mitchell, F. X. A. Leofred and C. L. Fellowes.

The motion, being seconded by Mr. F. H. Pitcher, was carried unanimously, and it was agreed that the Committee would appoint its own Chairman.

Col. W. P. Anderson presented the following resolution: "RE- Col. Anderson
SOLVED: That the attention of the Government of Canada be drawn to the waste of energy, time and money that has occurred and continues to occur:—

(1) Because of the duplication of survey work by different Departments of the Government, and between Dominion and Provincial Surveys;

(2) Because data published by one Department are ignored and not utilized by other Departments;

(3) Because the locations and particulars of new structures or works in charge of one Department are not communicated to other Departments interested.

"That this Society strongly recommends to the Government as practical remedies:—

(1) A system of registration of survey plans both Dominion and Provincial in such a way that their existence may be known to all the Departments and to outside interests;

(2) A system of control of surveys by a central bureau or commission of engineers, to prevent repetition of work already done;

(3) A regulation by such commissioners of all levelling undertaken by any Government Department of railway or municipal corporations, so that the same shall be referred to mean sea level, as now well determined at Canadian Harbours on both of the Eastern and Pacific Coasts; and thus to remove the confusion of the present want of system, which has resulted in nearly every levelling party establishing an independent datum plane."

In supporting the motion he did not think it was necessary to enlarge upon the situation. Every engineer knew the facts and the Government should take the necessary measures to remedy the defects. The facilities at the disposal of the Government for obtaining good results were entirely adequate, but there was such a lack of organization that there was absolutely no way in which an engineer could find out what plans were available or where to get them. He emphasized the fact that a special Committee having reported to the late Government without action having been taken, the present Government might be called upon to take some definite steps.

Mr. Butler

Mr. M. J. Butler remarked that the questions involved were considered in a report in the hands of the Department of Militia and Defence and the Government should be urged to put into effect the recommendations made by the Commission.

Mr. White

Mr. James White thought that this matter was one which was intimately connected with the establishment of a properly organized Engineering Corps and that until such action were taken it would be difficult to adequately deal with the problem.

On motion the matter was referred to the Council with instructions to make recommendations to the Government in regard thereto.

The Chairman stated that the next business would be the reception of and action in regard to reports of Branches.

Report of the Quebec Branch for the Year 1913

To the President and Members of the Canadian Society of Civil Engineers.

The Council of the Quebec Branch of the Canadian Society of Civil Engineers, presents the following report on the work of said Branch, during the year 1913:

Roll of the Branch

At present, the membership stands as follows:—

Members	20
Associate Members	38
Associates (Branch)	2
Juniors	12
Students	23
Total	95

Annual Meeting

The Annual Meeting of the Quebec Branch was held on the 20th January, 1913, under the Presidency of Mr. L. A. Vallee. The following Officers were elected for the year 1913.

President—A. R. Decary.

Secretary—A. Amos.

Councillors—J. F. Guay, S. S. Oliver, H. Ortiz.

The Past-Presidents are:—A. E. Doucet, P. E. Parent, W. D. Baillarge.

Meetings

The Quebec Branch held 10 Business Meetings during the year 1913.

Papers, etc., submitted by the Council of the Society and by the different Branches were discussed.

The proposed amendments to the By-Law No. 8, were unanimously disapproved by the Quebec Branch.

This Branch is of the opinion that all the Annual Meetings of the Canadian Society of Civil Engineers should be held at its Headquarters.

One Conference on Good Roads and Road Construction, was made by Mr. Gabriel Henry, Chief Engineer of the Provincial Department of Highways. This Conference was most interesting and greatly appreciated; the President in proposing a vote of thanks to Mr. Henry, expressed the desire that the example given by this gentleman would be followed by all the members of the Quebec Branch.

A. R. Decary, President.
A. Amos, Secretary.

The Secretary read the report of the Quebec Branch.

On motion by Mr. F. X. A. Leofred, seconded by Mr. E. Marceau, the report was adopted.

Report of the Ottawa Branch for the Year 1913

Messrs. the President, Council and Members,
The Canadian Society of Civil Engineers.

Gentlemen:—

On behalf of the Managing Committee of the Ottawa Branch we take pleasure in submitting the following Report for the year 1913, namely:—

Annual Meeting

This was held as usual at the beginning of last October, and resulted in the election of the following officers for the season of 1913-14, namely:—

Chairman—G. A. Mountain.

Managing Committee—M. F. Cochrane, F. J. Delaute, W. J. Dick, Alex. Gray, W. S. Lawson.

Secretary-Treasurer—A. B. Lambe.

The standing Committees were afterwards struck as follows, namely:—

Entertainment—W. J. Dick (Chairman), G. G. Gale, John Murphy.

Papers—Alex. Gray (Chairman), F. C. Askwith, W. S. Lawson, R. F. Uniacke.

Library—F. J. Delaute (Chairman), Valmore Denis, N. J. Slater, J. C. Stewart.

Rooms—M. F. Cochrane (Chairman), W. F. McK. Bryce, K. M. Cameron, G. B. Dodge.

The District Councillors are:—C. R. Coutlee, Ottawa, for 1911-12-13; D. McPherson, Ottawa, for 1912-13-14; S. J. Chapleau, Ottawa, for 1913-14-15.

The District Representative on the Nominating Committee is James White, Ottawa.

Membership

Quite a number of changes have taken place during the year, as our Members are constantly coming and going, but, except in the Student and Ottawa Associate classes, the net results are slight gains, as will be seen from the following table.

	January 1913	January 1914
Hon. Members	3	3
Members	49	51
Associate Members	112	116
Ottawa Associates	25	24
Juniors	12	15
Students	82	28
Totals	283	237

We much regret having to record the death during the year of three members, namely, Messrs. E. Jodoin, H. F. Cole and R. W. Farley, and the permanent disablement of an Ottawa Associate, Mr. James Fyfe.

Papers and Meetings

Our Papers Committee has been very fortunate in being able to present before the Branch a number of most valuable addresses, many of which have been of interest to not only our own members but also to quite a large section of the general public. This has produced in several instances attendances far too large for our Rooms, in which cases we have been favoured with the use of the Carnegie Library or the Normal School.

The following is the list of papers given before the Branch in 1913, namely:—

"Town Planning"—Mr. N. Cauchon, Ottawa.

"Underground Conduit Construction"—Mr. A. A. Dion, Ottawa.

"A Holiday Trip to the Panama Canal"—Mr. J. Murphy, Ottawa.

"Waterways versus Railway Transportation" -Mr. James White, Ottawa.

"Railroad Signalling"—Mr. R. F. Morkill, Montreal.

"Street Railway Track Construction"—Mr. R. M. Hannaford, Montreal.

"The Coquitlam Dam"—Mr. G. R. G. Conway, Vancouver.

"Economic and Social Effects of Transportation"—Dr. Adam Shortt, Ottawa.

"Automatic Cab Signalling"—Mr. H. A. Dupre, Ottawa.

"Economics of the Panama Canal"—Mr. James White, Ottawa.

Many of the above addresses were illustrated by lantern slides. The Meetings were held on the first and third Thursdays of each month throughout the winter season, namely from October to March inclusive.

Our Managing Committee meets regularly at 1 p.m. on the first Monday of each month, with special meetings as are from time to time found necessary.

Entertainment

The Entertainment Committee this season organized for the Branch a most delightful Dinner, held on December 4th, at the Chateau Laurier, one hundred and fifteen being present. As a further means of promoting mutual acquaintance among our members a system of monthly lunches has also been inaugurated.

Library

This is gradually working into fairly good shape, the Branch having been the recipient of quite a number of books, to the donors of which we are much indebted, and the Reading Room being equipped with all the more prominent engineering magazines.

Rooms

These remain as heretofore, because, while it is fully recognized that they are not entirely suitable for our purpose, our funds have not permitted us to contract for larger premises. It is hoped, however, that we will not only be able to get larger and better quarters in the near future, but also to equip them with a lantern, blackboard, etc.

In the meantime we are under many obligations to the authorities of the Normal School and Carnegie Library for having so kindly loaned us

their meeting rooms when ours were inadequate to hold our audiences, to the Conservation Commission for the frequent use of their lantern, and to the Ottawa Electric Company for special services from which to operate it.

Finances

The furnishing of our Rooms has, up to the present, made serious inroads into our income, but we are now substantially clear of that account, and so expect that in the near future we will be able to provide somewhat more liberally for some other pressing necessities of the Branch.

American Society of Civil Engineers

As you are aware the above Society honoured Ottawa by making this City the meeting place for their 1913 Summer Convention. Through the energy of a Committee, of which Mr. C. H. Keefer was Chairman and Mr. S. J. Chapleau, Secretary, the local members of the American Society and the Ottawa Branch of the Canadian Society, assisted by very kind and generous support, financial and otherwise, from the Dominion Government, and by many private contributions, were able to provide what was universally conceded to be most excellent entertainment for the four hundred odd members and guests of the American Society who came to the Convention.

All of which is respectfully submitted,

Geo. A. Mountain, Chairman.
A. B. Lambe, Secretary-Treasurer.

The report of the Branch was presented by Mr. W. J. Dick and, on motion by Mr. Dick seconded by Mr. James White, was adopted.

Report of the Kingston Branch for the Year 1913

C. H. McLeod,
Secretary, Can. Soc. C.E.

Dear Sir:

The following is all the report I have to make for Kingston:

The Annual Meeting of the Kingston Branch was held on January 23rd, and the following officers were elected for the current year:

Chairman—Alexander Macphail.

Sec.-Treasurer—L. W. Gill.

Executive Committee—L. Malcolm, J. B. Cochrane, G. C. Wright.

On account of the small membership of this branch, there is not much incentive to the writing of papers for branch discussion. Consequently

only a limited number of meetings were held during the past year. Most of these meetings were called primarily for the discussion of proposed amendments to the by-laws of the Society.

Respectfully submitted,

L. W. GILL, Sec.-Treasurer.

The Secretary read the report of the Branch.

Col. W. P. Anderson called attention to the small amount of work being done by this Branch and asked if the circumstances warranted its continuance, especially in view of the remission of dues to it. Col. Anderson

Mr. C. R. Coutlee thought it would be undesirable to do anything that would hinder the development of Branches, no matter how limited their scope. Mr. Coutlee

On motion the Report was adopted.

REPORT OF THE TORONTO BRANCH FOR THE YEAR 1913

The Executive of the Toronto Branch begs to present herewith the Annual Report for the year 1913.

The services of a very active and able worker in the interests of the Society were lost when Mr. Parker Kemble left last February to take up his residence in Cincinnati, Ohio. He was on the Executive of the Branch and it was due to his efforts that our Library is in its present satisfactory condition.

A card index has been prepared under the direction of the Library Committee of the Engineers' Club of the combined Libraries of the Toronto Branch, the Association of Ontario Land Surveyors, and the Ontario Association of Architects. These books are all located at the Engineers' Club and will by this means be accessible to all members of the three Societies. Reference is also made on the cards to technical books on the shelves of the Toronto Reference Library and of the Toronto University Library, so that excellent opportunity is afforded for consulting the authorities on almost every subject.

The Membership of the Toronto Branch this year is as follows: –

Members	42
Associate Members	102
Associates	8
Juniors	28
Students	35
Total	215

These figures represent the names on the roll, in October 1913, and show an increase over the figures for 1912 of 16 corporate members, 1 associate and 6 juniors, and a decrease of 8 students.

This last figure is very much to be deplored in Toronto, where 100 new men are registering in Science each year, and the present Executive begs to suggest to the officers for the following year that some special means be adopted for reaching the younger men, and interesting them in the work of the Society. The formation of an Association of Students, as is done in connection with the Institution of Civil Engineers, would, no doubt, serve this purpose. Papers could be read by the Students and trips of inspection made that would prove to be of great interest and benefit.

The lack of interest shown in the meetings by the members has been responsible for the fact that no papers were read before the Branch this year, and it is hoped that papers of sufficient interest to attract a good attendance at the meetings in the coming year, will be secured.

The officers for the year 1914-15 are:—

Chairman—A. F. Stewart.

Hon. Secy.-Treas.—J. S. Galbraith, Jr.

Executive Committee—J. G. Kerry, C. H. Mitchell, Prof. P. Gillespie and E. A. James, *ex officio*.

Respectfully submitted,
E. A. James, Chairman.
A. B. Garrow, Hon. Secy.-Treas.

The report of the Branch was read by Mr. J. Galbraith.

Col. Anderson

Col. W. P. Anderson called attention to the fact that the work of the Branch during the year seemed to have been limited to the election of new officers and the construction of a card index for its library.

Mr. Irving

Mr. T. C. Irving, Jr., pointed out that the circumstances under which the work of the Toronto Branch was done were entirely different from those of the Ottawa Branch. The Toronto Branch was in close alliance with the Engineers' Club; in reality a large amount of work had been done in regard to the library and in the matter of organization for future work; also the funds of the Branch were being conserved, and he could promise that the work of the Branch during the next year would be entirely satisfactory to the Society at large.

Mr. Chipman

Mr. W. Chipman supported Mr. Irving in his explanation and further stated that there had been certain difficulties in the operation of the Branch during the past year which would be overcome in a future season.

Prof. Haultain

Prof. H. E. T. Haultain, in further support of the Branch, stated that there were no less than 44 members present at their last Annual Meeting and that at this meeting plans for the development of the Branch had been carefully considered and to a certain extent matured.

Mr. Harkom

Mr. J. W. Harkom remarked that the Society should encourage its Branches throughout the Dominion and that the effective work of the Society must in a great measure depend on its Branches.

On motion it was unanimously resolved that the report of the Branch should be received and adopted.

The Secretary read the report of the Manitoba Branch, which on motion was received and adopted.

Report of the Manitoba Branch for the Year 1913

President and Members of the
Canadian Society of Civil Engineers.

Gentlemen:—

The Manitoba Branch of the Canadian Society of Civil Engineers begs to submit the following annual report for the year 1913. The officers for the year 1913 were as follows:—

Chairman—J. G. Legrand.

Executive Committee—W. A. Duff, D. A. Ross, W. L. MacKenzie, Frank Lee.

Secretary-Treasurer—E. Brydone-Jack.

Meetings

The following papers were read and discussed at the regular meetings of the Branch:—

"Some Facts Concerning the Panama Canal," by J. G. Sullivan.

"The Use of Asphaltum in Protecting Levees and Railway Embankments," by Mr. Percy.

"The Auxiliary Steam Plant of the Winnipeg Electric Railway," by D. A. Ross.

"Steam Power Plant for Mechanical Department Yards at Divisional Points," by H. Lorimer.

The attendance at these meetings averaged about thirty.

There is a total membership of the Branch of two hundred and eighty-three, classified as follows:—

Members	33
Associate Members	101
Associates	1
Juniors	9
Students	89
Local Associates	50

At the first of the year an Electrical Section of the Branch was formed, which held meetings as follows, independently of the regular meetings of the Branch. At these meetings the following papers were presented:—

"Physical Characteristics and Source of Illumination," by E. P. Fetherstonhaugh.

"Engineering Aspects of Illumination," by J. G. Glassco.

"Economics and Aesthetics of Illumination," by H. N. Ruttan.

"Recent Developments and Electrical Operation of Coal Docks," by F. H. Farmer.

"The Diesel Crude Oil Engine," by C. F. Bowring.

"Electric Heating from the Economic Standpoint," by Wm. Aldridge.

"Underground Cables," by M. B. Stewart.

"Comparison of British and Canadian Practice in the Distribution of Electrical Energy," by E. V. Caton.

There was a demonstration of resuscitation from electrical shock given by Mr. Arlidge at one of the meetings.

A mechanical section of the Branch was also formed at the end of the year, but no meetings were held prior to December 1st, 1913.

The Branch has co-operated with the Western Canada Railway Club and secured a room in the Industrial Bureau Building, where the members can have access to Engineering Periodicals, and where the nucleus of a library is being established.

At the annual meeting held on December 4th, the following officers were elected for 1914.

Chairman—E. Brydone-Jack.

Executive Committee—Frank Lee, W. L. MacKenzie and D. A. Ross.

Secretary-Treasurer—G. E. Bell.

The annual dinner was held on December 16th, 1913, in the Fort Garry Hotel, at which about ninety members and guests attended. The Treasurer's report showed a balance in hand at the end of the year of $645.89.

Yours truly,
G. E. Bell, Secretary-Treasurer.

The Secretary then read the following report from the Calgary Branch, which on motion was received and adopted.

Report of the Calgary Branch for the Year 1913

To the President and Members of the
Canadian Society of Civil Engineers.

Gentlemen:—

The first step toward the formation of the Calgary Branch was taken in 1912, when Mr. J. T. Child invited a few of the members of the Society living in Calgary to meet in his office in the City Hall, on July 2nd, to discuss the advisability of forming a Branch in Calgary. While those who attended this meeting (six in number) were heartily in favour of forming a branch in Calgary, no definite steps were taken until March, 1913, when a circular letter, bearing the names of J. T. Child, H. B. Muckleston and F. H. Peters, was sent to all the members of the Canadian Society of Civil Engineers residing in the vicinity of Calgary, asking them to attend a meeting in the Government Irrigation Office, in the old Post Office Building, on March 12th, 1913. This meeting was attended by nineteen

corporate members and one student, all of whom were in favour of starting, and signified their willingness to support a Branch in Calgary. By-laws were adopted, temporary officers elected, and subscriptions started at this meeting. Shortly after, a formal application was forwarded to the Parent Society and the Calgary Branch became a fact. Another meeting was held in the Government Irrigation Office on June 21st, 1913, and at this meeting the following officers were elected to act until the Annual Meeting in December:—

Chairman—H. B. Muckleston.

Secretary-Treasurer—P. M. Sauder.

Executive Committee—H. B. Muckleston, F. H. Peters A. S. Dawson, E. L. Miles and P. M. Sauder.

Owing to the fact that a very large percentage of our members are engaged in work which takes them out of the City during the summer and fall, no regular programme was attempted during the summer, but a club-room has recently been rented and it is expected that a regular programme of meetings, at about two weeks intervals, will be carried our during the winter and spring.

Messrs. T. E. Robinson and P. J. Jennings represented this Branch at the Annual Convention of the Western Canada Irrigation Association, in Lethbridge, on August 4th, 5th and 6th last, while Messrs. H. B. Muckleston, F. H. Peters and P. M. Sauder, of this Branch, represented the Parent Society at this Convention.

H. A. Moore, General Manager of the Calgary Power Company, extended an invitation to the members of the Branch to visit the new dam and power plant under construction at Kananaskis Falls, which a party of thirty-two accepted on November 29. This trip was both pleasant and interesting.

The Annual Meeting was held on December 6. The Secretary-Treasurer's report at that time showed the total receipts to date (subscriptions only) as $300.00, total disbursements $31.00, and balance in the Bank $269.00. The Chairman and Secretary-Treasurer were re-elected to serve another year and together with F. H. Peters, A. S. Dawson and G. Romanes, form the Executive Committee for 1914.

The year was closed by a dinner at 6 p.m., on December 30th, at which J. S. Dennis, Assistant to the President of the Canadian Pacific Railway Company and a member of the Council of the Canadian Society of Civil Engineers, was the guest of honour and gave a very interesting address on "Early Surveys and Surveyors of Western Canada."

Respectfully submitted,

P. M. Sauder, Secretary-Treasurer

The Secretary then read the reports of the Victoria and Vancouver Branches and on motion these reports were received and adopted.

Report of the Victoria Branch for the Year 1913

The President and Members,
Canadian Society of Civil Engineers.

Gentlemen:—

During the past year our Branch held 10 Meetings with an average attendance of 18, and the following papers were read, viz.:—

February 13th—"Some Engineering Works in B.C." (first section). Illustrated with lantern slides. F. C. Gamble, Vice-President.

November 13th—"Some Disregarded Stresses at Joints and Ends of Steel in Reinforced Concrete Construction," H. A. Icke, A.M.

December 11th—"A Cellular Method of Vibrated (Reinforced) Concrete Construction," J. B. Holdcroft, A.M.

Our membership increased from 62 to 82, but owing to the removal of 2 corporate members from our district the net total stands at 80, distributed as follows:—

Members	16
Associate Members	29
Juniors	8
Students	4
Associates of Branch	23
Total	80

All our Branch Associates are engineers who have applied for admission to Can. Soc. C. E.

At the annual meeting held on December 11th, the following officers were elected for 1914:—

Chairman—F. C. Gamble (re-elected)
Vice-Chairman—D. O. Lewis.
Treasurer—A. E. Foreman (re-elected).
Secretary—R. W. Macintyre (re-elected).
Executive—The above officers with L. W. Toms and E. H. Harrison.
Auditors—H. A. Icke and F. A. Richardson.

With a view to developing the social side of the profession, receptions are being held in the Club rooms during the winter months, and attended by members and ladies.

The year's programme closed with 2nd Annual Convention of B.C. members in Vancouver, on December 13th.

It is our intention to keep a Register of all engineers belonging to the Branch, who are available for employment, giving record and qualifications in each case.

From this a list will be compiled and forwarded to the Provincial Government and Municipal bodies in B.C.

Respectfully submitted,
R. W. Macintyre, Secretary.

REPORT OF THE VANCOUVER BRANCH FOR THE YEAR 1913

The President and Council,
Canadian Society of Civil Engineers,
Montreal, Canada.

DEAR SIRS:—

The present membership of the Branch is 146, distributed as follows: –

Members	42
Associate Members	74
Associates	1
Juniors	11
Students	18

During the year the Branch has held twelve meetings, besides the meetings of the Convention of the British Columbia Members, held here on the 12th and 13th December. The following papers were read:—

"The Pulp and Paper Industry in B.C.," by C. H. Vogel, A. M. Can. Soc. C.E.

"The Burrard Inlet Joint Sewerage Scheme," by A. D. Creer, A.M. Can. Soc. C. E.

"The Outlook for Mining in B.C.," by C. E. Cartwright, M. Can. Soc. C. E.

"Some Public Works and Explorations in B.C., Since 1880," by F. C. Gamble, M. Can. Soc. C. E.

"Modern Methods in the Manufacture of Portland Cement," by H. K. G. Bamber, Assoc. Inst. C. E.

"Coquitlam-Buntzen Hydro-Electric Development," by G. R. G. Conway, M. Can. Soc. C. E.

"Stave Falls Hydro-Electric Development," by R. F. Hayward, M. Am. Soc. C. E.

At the meeting of January 20th, the following officers were elected:—

Chairman—G. R. G. Conway, M. Can. Soc. C. E.

Vice-Chairman—L. G. Robinson, A. M. Can. Soc. C. E.

Secretary-Treasurer—F. P. Wilson, M. Can. Soc. C. E.

Executive—C. E. Cartwright, M. Can. Soc. C. E., W. A. Clement, M. Can. Soc. C. E.

Auditors—A. D. Creer, A. M. Can. Soc. C. E., H. P. Archibald, A. M. Can. Soc. C. E.

At the meeting of April 21st, new By-laws were adopted. The By-laws increased the Executive Committee from five to seven, the date for the election of officers was changed to May, the retiring officers to hold office until the opening meeting in October. Messrs. C. G. DuCane and A. D. Creer, Assoc. Members, Can. Soc. C. E., were elected to fill the vacancies on the Executive and it was decided that the present officers should hold office until October 1914.

The second Annual Dinner was held at the University Club on March 29th, about one hundred and ten members and guests were present.

During the Summer months, the following excursions were arranged by the Branch and many of the members attended:—

May 10th—To Coquitlam Dam, through the courtesy of the Vancouver Power Co.

June 6th—Special train over Saanich Railway, provided by the courtesy of the B.C. Electric Railway, to Bentwood Bay, where the Steam Turbine Plant was examined, and to Bamberton, where the members were shown over the new plant of the Associated Cement Co., through the courtesy of Mr. Bamber, Managing Director of the Company.

July 12th—To the Stave Falls Power Plant, through the courtesy of the Western Canada Power Company.

September 27th—To the Lake Buntzen Power Plant, by the courtesy of the Vancouver Power Company.

Yours faithfully,

J. R. GRANT, Acting Secretary-Treasurer.

The Secretary

The attention of the meeting was then called by the Secretary to the fact that there was in hand a somewhat voluminous report giving the proceedings of a joint meeting of the Vancouver and Victoria Branches, held in Vancouver, on December 13th, 1913.

Mr. Rust

Mr. C. H. Rust, representing the Victoria Branch, said that on account of the length and discursive nature of this report he did not think it need be read. He was present at the Convention, which was a very successful and interesting gathering.

After some discussion, however, it was agreed that the report should be read on Wednesday afternoon immediately on the opening of the meeting.

At the request of the President, whose voice had failed him on account of a severe cold, the Secretary read the following Presidential address.

PRESIDENT'S ADDRESS

By PHELPS JOHNSON

GENTLEMEN,—

It is decreed by custom that a retiring President of the Society shall make an Address. A good number of my predecessors in the office, following what was probably to them the line of least resistance, have given you a paper on some engineering topic.

I considered following this course, but abandoned the idea for the reason that it seemed impracticable to treat in a satisfactory way a problem in bridge construction without the aid of diagrams and lantern illustrations.

A general review of the progress made in the different fields of engineering, or a review of the more important works that have been carried out in Canada, are both beyond my limitations. I shall, therefore, speak to you only on Society matters, and I am the more ready to do this for the

reason that at our last annual meeting and later in published correspondence, complaint was loudly voiced that the Society was not doing enough for its members, and the Officers and Council of the Society did not escape serious criticism.

The objects and purposes of the Society are in its Charter stated to be, "to facilitate the acquirement and interchange of professional knowledge among its members".

It seems evident that this basic purpose of the Society can best be achieved by having enrolled in its membership a large proportion of the able and active engineers of the country, by the interchange of thought and of experience at its meetings and particularly by the reading, discussion and circulation of papers on important and interesting works or investigations.

The Society was organized 26 years ago by a few of the then prominent engineers of Eastern Canada. The movement met with the enthusiastic support of most of the Engineers then in active practice, and at the time of the first annual meeting in 1888 there were 225 members and 65 associate members, or a total corporate membership of 290. From that date the number has steadily increased until we have at the present time 622 members and 1,313 associate members, or a corporate membership of 1,935. A few of these members, less than 40 in all, have come in under the Quebec Act, and a few more in this Province have joined almost under compulsion because of the Act, but the large majority have joined without pressure and without special solicitation, evidently because they considered membership in the Society beneficial and that to belong to it gave them a standing in the profession and in the community that otherwise they would not have.

While the growth of the Society in numbers has been very satisfactory there has been no corresponding growth in the enthusiasm of its members, as evidenced by attendance at the meetings, by the preparation and contribution of papers, or of discussion on the papers submitted, but rather the reverse. The first eight years of the Society's history there was an average corporate membership of 378 and an average of 13 papers per year were submitted, read and published. The last 18 years the average corporate membership has been 921 and the average number of papers per year, again 13. In the first 8 years a paper was presented by one member out of 29. During the last 18 years we have had one paper for each 71 members. During the last 3 years we have had one paper for each 132 members.

Real enthusiasm cannot perhaps be worked up to order, but we can all do our duty, and I would call to your attention that following our election we have all agreed "to promote the objects of the Society so far as in our power", and "to present to the Society an original communication" (meaning a paper) "or some scientific work for the library".

I fear a great many members have so far overlooked this pledge and hope for a great increase in the number of papers in the near future. I

would particularly urge that the younger members prepare and submit papers describing the work on which they are engaged, or of which they have good knowledge, and this as much for their own sake as for the good of the Society, for the presentation of a paper of merit will go a long way toward giving them a professional standing they cannot well gain in other ways. A good paper need not necessarily be based on a large and important work, or even a successful one, for failures are often the source of very valuable information.

In connection with the complaint that the Society has not been doing enough for its members, it will be interesting to inquire what other Societies of similar nature are doing for their members. The Societies which at once come to mind for comparison are the Institution of Civil Engineers of Great Britain and the American Society of Civil Engineers. Both of these Societies have been long established and have a large membership, both have accumulated valuable properties and have annual surplusses of revenue over ordinary expenditures greater than our entire gross revenue. With ample means at their command and with able management it would seem that we may reasonably expect to find these Societies rendering their members every obvious useful service.

The British Institution of Civil Engineers publishes and distributes to its members four volumes per year, each volume containing the reports of the meetings that have been held since the last issue and a list of those admitted as students or as members, or transferred from one class to another. The papers read at the meetings and the oral and written discussions thereon are published, as well as a number of "selected papers" which apparently have not been read and discussed but are considered worthy of publication. A good part of each volume is devoted to "Abstracts of Papers in Scientific Transactions and Periodicals", a typical volume devoting over 100 pages to short reviews of 170 selected articles. The abstracts in the volume examined bear the initials of thirteen different reviewers, and this suggests that the work is not done by the Secretary's staff, but by writers familiar with engineering subjects, specially engaged for the work.

The American Society of Civil Engineers publishes in pamphlet form ten volumes of proceedings per year, each containing brief reports of the meetings of the Society and of the Board of Direction, which corresponds to the Council of this Society, the names of members elected and transferred from one class to another, a list of additions to the library with a synopsis of the contents of the more important books and gives a list of recent engineering articles of interest, reviewing for this purpose more than 100 publications. Each volume also contains a number of original papers with the discussions thereon.

It will be seen that both of these Societies not only publish their transactions more frequently than our Society, but go to considerable expense in keeping their members advised as to recent engineering literature.

Aside from their activity in this direction I am unable to find that these older and larger Societies do their members any service which we are not endeavoring to do for our members, and it is to be borne in mind that these Societies are financially able to do for their members every useful service considered desirable.

Neither of these Societies has branches or divisions corresponding to our own, though there are a number of local "Associations of Members of the A.S.C.E." in various parts of the United States which hold regular meetings and read and discuss papers as do our Branches. These associations have Charters approved by the parent Society but receive no financial assistance from it.

Apparently the only useful suggestions we can get from the practice of these two older Societies are the desirability of more frequent reports to the membership, and keeping the members advised of current engineering literature, the latter a matter of considerable expense which the finances of the Society have not heretofore permitted.

The criticisms made at our meetings and in correspondence have as a rule been very general and with few specific suggestions. There seems to be a feeling that the officers and the Council are not doing all they should, that they are not keeping the members well posted, that the Council is not fairly representative of the different districts, and that it would be well if its members were younger and more enthusiastic and if they served shorter terms.

The remedy for these faults, if they exist, is in the hands of the membership at large, for it can make and alter By-laws, can designate the Nominating Committee, and can elect Councillors, and through them control the policy of the Society.

Some of the members, I believe a very small proportion, evidently feel strongly that the Society should interest itself in the troubles of its individual members, with the Municipalities and Corporations employing them, and particularly that the Society should take active steps to keep out so-called Alien Engineers, and conserve Canadian business for the members of the Society.

I can conceive of no course so sure to discredit and disrupt the Society as to adopt Labor Union methods, and interfere in the disputes of engineers with their employers.

I agree that Canadian work should as a rule be done by members of this Society, but pressure to this end can best be exerted by the local members and branches, and I feel strongly that except in connection with works handled direct by the Dominion Government, the Society should not officially intervene.

On the whole I consider the complaints that have been made to have little support in existing conditions and believe that the Society has in the past done for its members about all that could reasonably be expected. I do think, however, that the members of the Society have in great measure failed to do for the Society and for themselves all they should and believe

they can hereafter, by taking a more active interest in it, by contributing and discussing papers, by attending meetings of the Society and Branches, by paying more attention to the applications for membership and advising the Council in regard thereto, and in other ways, make the Society of use to themselves and at the same time promote its interests.

In conclusion I wish to point out one way in which it may be the Society can be of great use to members without engagements or desirous of changing their employment.

The suggestion comes through the Engineering News of the 21st of August last, which, in an article headed "Making Membership in an Engineering Society a Tangible Asset", states that the "Junior Institution of Engineers" in England, a Society of which I have no special knowledge, has undertaken the establishment of a permanent Engineers' Register which will give a complete record of the professional career of every member, the purpose being to form a sort of clearing house to assist members in improving their positions by systematically recording the particulars of their experience and technical training, and by effecting the introductions to engineering employers of members who possess such qualifications as may fit them for vacant positions. To establish and maintain a Register of this nature would involve considerable expense, and would require the hearty co-operation of all members. I think, however, the suggestions well worthy the serious consideration of the incoming Council.

The address was received with applause which was suitably acknowledged by the President.

Mr. Irving

On the suggestion of Mr. T. C. Irving, Jr., it was unanimously resolved that the President's address should be printed and issued to all members of the Society.

The meeting then adjourned.

Tuesday Evening, January 27th

A Smoking Concert was held at the Society's rooms under the direction of an Entertainment Committee of local Members of Council.

Wednesday, January 28th

The forenoon of this day was devoted to visiting works, the members of the Society having been invited by the President, Mr. Phelps Johnson, in his capacity as President of the St. Lawrence Bridge Co., Ltd., to visit the works at Rockfield, P.Q. By the courtesy of the Montreal Tramways Co. special cars were provided to convey the party to Rockfield. The party was entertained at luncheon by the Company. The members are indebted to Messrs. G. H. Duggan, W. P. Ladd and J. F. Weber for courtesy shown them.

WEDNESDAY AFTERNOON, JANUARY 28TH

The meeting was called to order at 3 p.m., the President, Mr. Phelps Johnson, in the Chair.

The Secretary read the verbatim report of the Convention of the British Columbia members held in Vancouver, on December 13th, 1913. This report is summarised as follows:—

The Convention discussed the ballot for amendment to by-laws as submitted by the Council and especially the letter of the Council in explanation thereof. In connection with this discussion the following resolution was adopted:—

> "That this meeting desires to put upon record that it is of the opinion that the ballot as sent out by the Council and dated 17th November, 1913, is not a proper one, inasmuch as there appears to be an unfortunate attempt to influence the voting of the members by expressions of opinion as to the merits and demerits of certain of the proposed by-laws. This meeting is further of the opinion that such a ballot would form a very dangerous precedent for the future. The meeting further resolved that this expression of the feelings of the members of the B.C. Convention should be forwarded to the Council."

Technical discussions of interest on the following subjects were also reported in the proceedings of the Convention:—

1. Standard Datum Plane.
2. The Education and Training of Engineers. In connection with the latter the following resolution was adopted:—

> "That when the formation of the engineering college (Vancouver) is under way two or three representatives of the Society be appointed to confer with the University authorities with a view to representing the views of the Canadian Society of Civil Engineers on the arrangement of courses."

Mr. F. C. Gamble addressed the Convention on the status of a civil engineer and his relation to public affairs; the disabilities under which the engineering profession labours and the lines along which remedial legislation should be sought.

The President

After the reading of the report the President made a statement as to the motives which governed the Council in submitting to the membership the by-laws referred to in the resolution adopted by the British Columbia members. He explained that the by-laws had been very carefully considered by a meeting of Council especially called for the purpose at which there were present representatives of practically all parts of Canada, including Mr. F. C. Gamble, Vice-President of the Society, a resident of Victoria, B.C. The meeting had adopted the proposed by-laws unanimously, with the exception that Mr. Gamble thought that some financial help should be given to the Provincial Divisions directly from the funds of the Society. It was the opinion of the Council that the Provincial Divisions should in no way supersede the Branches and that the Society should

continue as heretofore to deal directly with them. On Mr. Gamble's return to the Pacific Coast, certain British Columbia members had proposed another form of by-law which differed from that adopted by the Council in that it disregarded the Branches established in the Province, and also required that a rebate of $1.00 should be made to the Division on the yearly subscription of every member resident in the Province not connected with local Branches.

In view of the fact that the Council's by-law had been adopted by so largely attended a meeting, the subsequent meetings of Council did not consider that there was any alternative but to send out both proposed amendments. In doing so they thought that it was their duty to give some statement of the reasons which had actuated them in their finding. The statement had been very carefully considered and in the opinion of the Council it was due to the membership at large that an explanation of the circumstances should be given to them.

An extended discussion followed which, in view of the resolution adopted at the following session, it was not, in the opinion of that meeting, considered necessary or desirable to publish.

A Report of the Manitoba Branch, communicating a discussion arising out of Mr. J. G. Legrand's report on the proceedings of the previous Annual Meeting and the proposed amendments to by-laws, held on November 6th, 1913, was read by the Secretary.

This meeting discussed the desirability of revising the geographical subdivisions of the Society and so arranging that each division would be represented by a Board which would take in hand the organisation of Branches in various towns and other matters of interest to the Society. No finding was, however, arrived at in this connection.

As a result of the discussion of the by-laws, the following resolution was unanimously adopted by the Manitoba members:—

> "That the Manitoba Branch of the Canadian Society of Civil Engineers approve the principles contained in the proposed amendments to the by-laws of the Society as carried at a Council meeting, held in Montreal, September 20th, 1913; and further recommends that many of the details be more carefully considered, and that a full discussion of the same be held at the next Annual Meeting."

The Secretary, in response to a request made on Tuesday as to outstanding arrears at the end of 1913, reported as follows:—

For 1913:—

Members	$1,469	
Associate Members	4,456	
Associates	85	
Juniors	530	
Students	384	
		$6,924

For 1912 and previous years:		
Members	$964	
Associate Members	3,907	
Associates	125	
Juniors	403	
Students	395	
		5,794
Total		$12,718

The auditor had conservatively estimated the value of these arrears at $5,000.

The Secretary also reported the following as the membership of the Branches of the Society at the date of the Annual Meeting in 1913: -

	Corporate Members	Non-Corporate Members
Quebec	38	7
Ottawa	153	76
Kingston	14	5
Toronto	128	74
Manitoba	130	84
Calgary	30	5
Vancouver	95	18
Victoria	36	5
	624	274

Mr. J. A. Jamieson stated that in his opinion so large an amount of arrears should not exist. It would also seem that certain Student members were carried on the Society's list long after they had reached the age limit. Mr. Jamieson

The President called the speaker's attention to the Report of Council under which he would find that 437 Students had been dropped from the list during the past year because they had exceeded the age limit and for non-payment of dues. The President

The matter of outstanding arrears was referred to the Finance Committee.

On motion the meeting was adjourned.

Wednesday Evening, January 28th

The Annual Members' Dinner was held at the Engineer's Club. The dinner was attended by some 200 members, the Chair being occupied by Mr. H. H. Vaughan, Vice-President, in the absence of the President, Mr. Phelps Johnson, through illness.

THURSDAY MORNING, JANUARY 29TH

The President, Mr. Phelps Johnson, called the meeting to order at 10.20 a.m.

The discussion regarding the resolution of the British Columbia members was resumed, and on motion by Mr. J. G. G. Kerry, seconded by Mr. R. A. Ross, it was resolved on division:—

"That this meeting has considered the resolution of the British Columbia Branches objecting to the action of the Council in commenting on a proposed amendment to the by-laws and is of the opinion:

(1) That the Society welcomes any expression of opinion or advice from the Council concerning matters of general import with which the Society proposes to deal;

(2) That it suggests that such opinion or advice be printed independently of the ballot to which it refers;

(3) That the incoming Council be entrusted to further deal with the development of the branch and divisional system as part of the organisation of the Society."

The Secretary then read the following letter from Mr. G. A. Mountain, Chairman of the Gzowski Medal Committee:—

January 22nd, 1914.

"To the Council of
The Canadian Society of Civil Engineers.

The Gzowski Medal Committee for the present year beg to report that in their opinion the Gzowski Medal should be awarded to Julian C. Smith, Member of the Canadian Society of Civil Engineers, for his paper on High Voltage Transmission Lines. Your Committee also wish to state that as a whole the papers of the year were particularly good and of special interest.

Yours truly,
(Signed) Geo. A. Mountain,
Chairman, Gzowski Medal Committee, C.S.C.E.
J. Galbraith
A. E. Doucet
E. Brydone-Jack
W. J. Stewart
Members, Gzowski Medal Committee, C.S.C.E."

By unanimous resolution the report was adopted and the medal awarded to Mr. J. C. Smith.

The Secretary read a report on the award of prizes for papers presented by Students in the several sections. These prizes were awarded in accordance with the report as follows:—Messrs. C. R. H. Fuller for his paper on "The Domestic Purification of Public Water Supplies," and J.

Robertson for his paper on "Movable Bridges," both papers being presented in the General Section and considered of equal merit. No prizes were awarded in the other sections.

The scrutineers on amendments to by-laws presented their report which was adopted.

The President declared the amendments to by-laws Nos. 9, 20, 36, 51 and 57, proposed by the Council, as having been carried by the necessary two-thirds majority. The two amendments to each of the by-laws Nos. 8 and 56 had failed of adoption not having secured the necessary majority.

The report of the scrutineers for the election of officers and members of Council was presented and the President declared the following elections:

As President.....M. J. Butler, C.M.G.
As Vice-President.....R. A. Ross
As Councillors:—
District No. 1.....J. M. R. Fairbairn
H. M. MacKay
District No. 2.....R. McColl
District No. 3.....A. R. Decary
District No. 4.....R. F. Uniacke
District No. 5.....W. A. Bucke
District No. 6.....F. Lee
District No. 7.....G. R. G. Conway

Mr. Phelps Johnson then resigned the Chair to the newly elected President.

Mr. M. J. Butler in taking the Chair said:—"I can only faintly express my appreciation of the very great honour which has been conferred upon me by my election to the highest position in the gift of the Society, and to the distinction of having succeeded so able a President as my friend Mr. Phelps Johnson." Mr. Butler

The President then placed before the meeting the business of the election of members of the Nominating Committee for Officers and Members of Council for the year 1915.

The Secretary read the nominations for the various districts.

For District No. 1—Montreal and district within 25 miles—the Council had nominated Mr. J. Duchastel de Montrouge.

Mr. Wm. McNab nominated Mr. J. A. Jamieson to represent District No. 1.

A vote having been taken, Mr. Duchastel de Montrouge was declared elected.

For District No. 2—Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick and the United States—the name of Mr. J. S. O'Dwyer was proposed by Messrs. W. B. Mackenzie and F. A. Bowman, Members of Council. On motion Mr. O'Dwyer was unanimously elected.

For District No. 3—Province of Quebec (outside of the headquarters district), countries outside of Canada, Newfoundland and the U.S.A.—on the nomination of the executive of the Quebec Branch Mr. R. A. Black was unanimously elected.

For District No. 4—Ottawa and the Province of Ontario East of and including Lindsay—the Ottawa Branch nominated Mr. O. Higman and the Kingston Branch nominated Prof. L. W. Gill. On the suggestion of members of the Ottawa Branch who were present, Prof. Gill was unanimously elected.

For District No. 5—the Province of Ontario West of Lindsay—Mr. J. G. G. Kerry was unanimously elected on the nomination of the Toronto Branch.

For District No. 6—the Provinces of Alberta, Saskatchewan and Manitoba—the Manitoba Branch nominated Mr. E. P. Fetherstonhaugh and the Calgary Branch nominated Mr. J. S. Dennis. A vote having been taken, Mr. Dennis was declared elected.

For District No. 7—the Province of British Columbia—the Victoria Branch nominated Mr. D. O. Lewis and the Vancouver Branch nominated Mr. F. F. Busteed. A vote having been taken, Mr. Busteed was declared elected.

The Secretary read a letter from Mr. F. X. A. Leofred of the Quebec Branch regarding the procedure of the Nominating Committee. The authorised procedure of the Committee having been explained, Mr. Leofred's letter was referred to the Council.

A discussion took place as to the interest taken in the Society by the membership at large, a matter which had been referred to in the Presidential address. It was suggested that a greater enthusiasm as to matters of professional interest might be aroused in the members.

Mr. Francis

Mr. W. J. Francis was not of opinion that there was any lack of enthusiasm either at the headquarters of the Society or in the several Branches which, in his opinion, were all very much alive.

Mr. Vaughan

Mr. H. H. Vaughan concurred in the views of Mr. Francis and remarked that at every Annual Meeting which he had attended an accusation of a similar character had been made. The Council had been blamed for not working the members up to a height of abnormal enthusiasm. He was unable to understand how it happened that whenever a member was elected to the Council he was immediately regarded by the membership at large as being placed on a superannuation list. There was a disposition on the part of certain members attending the Annual Meeting to indulge in a prolonged debate on the merits of the Council instead of discussing matters of real importance and of benefit to the Society, in

connection with which he was reminded of the old aphorism "The devil finds some mischief still for idle hands to do." He had a suggestion to make to the incoming Council, viz., that they get after the members and so arrange matters that they would be compelled to talk about matters of real engineering importance at the next Annual Meeting and not indulge in a family scrap. The membership should remember that they should throw overboard their attitude of hostility to the management and come to the Annual Meeting with the firm intention of doing something useful.

The Secretary read the following letter from the Quebec Branch:—

January 27th, 1914.

"Prof. C. H. McLeod, Secretary,
Canadian Society of Civil Engineers, Montreal.

Dear Sir,

I beg to transmit to the Council of the Society the following Resolution of the Quebec Branch which was carried at the last Council Meeting of the Branch, held on the 23rd instant.

Proposed by A. Leofred.

Seconded by P. E. Parent, and

Resolved unanimously

That owing to the importance of the question of cast iron and steel in the construction of water pipes;

That owing to the great diversity of opinion on the relative merits of cast iron and steel for the purpose;

Recommended that a Committee be appointed at the general meeting of the Canadian Society of Civil Engineers with the object of making a complete study of the matter, expressing an opinion and drawing conclusions to submit to the Canadian Society of Civil Engineers as soon as possible.

Yours truly,
J. des R. Tessier,
Secretary.

(Signed) Arthur Amos,
Chairman."

On motion the resolution of the Quebec Branch was referred to the Committee which had been appointed at a previous meeting on Cast Iron Water Pipes and Specials.

On motion by Mr. F. X. A. Leofred a resolution was unanimously adopted expressing the gratitude of the members to the President and retiring officers and Members of Council.

On motion by Mr. E. W. Oliver, seconded by Mr. G. A. Mountain, a vote of thanks was unanimously tendered to the Railways of the Eastern Canadian Passenger Association, especially to the Canadian Pacific Railway and Grand Trunk Railway for their kindness in placing facilities at the disposal of the Society at their Annual Meeting.

On motion by Mr. C. N. Monsarrat, seconded by Mr. James Kennedy, the thanks of the Society were tendered to the Montreal Tramways Company for their courtesy in providing special cars for the visit to the St. Lawrence Bridge Company's works, at Rockfield.

On motion by Mr. R. F. Uniacke, seconded by Mr. D. MacPherson, the thanks of the members in attendance was accorded to the St. Lawrence Bridge Co. for the opportunity to visit its magnificent plant and for the hospitality tendered to members of the party.

The meeting then adjourned.

The

Canadian Society of Civil Engineers

176 Mansfield Street, Montreal

Established Feb. 24th, 1887. Incorporated by Dominion Act, June 23rd, 1887
(50 Vic., Cap. 124)

REPORT

OF

ANNUAL MEETING

1915

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Volume XXIX

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The Canadian Society of Civil Engineers.

REPORT OF PROCEEDINGS OF TWENTY-NINTH ANNUAL MEETING HELD AT THE SOCIETY'S HOUSE, 176 MANSFIELD STREET, MONTREAL, 26TH to 28TH JANUARY, 1915.

The President, Mr. M. J. Butler, C.M.G., in the Chair.

MORNING SESSION, 26TH JANUARY, 1915.

The Meeting was called to order at 10 a.m. The President read the following telegram from Lt.-Col. C. H. Mitchell, General Staff Officer, First Canadian Contingent:—

"To the Canadian Society of Civil Engineers, 176 Mansfield Street, Montreal. Greetings, President and members, annual meeting. Keep flag flying."

He also read a telegram from the Edmonton Branch of the Society as follows:—

"Edmonton Branch take this their first opportunity of extending greeting to the Society and express hope that we shall be able to do our share in extending its influence and look forward to time when provincial organizations will be established, and when they and Branches will occupy a place of still more importance in society affairs."

The Minutes of the Annual Meeting held January 27th to 30th, 1914, were read and approved. On the nomination of the President, the following gentlemen were elected as scrutineers for the ballot for the election of officers and members of Council for 1915:—Messrs. James Ewing (Chairman), J. A. Burnett, H. S. Deubelbeiss, V. A. G. Dey, E. G. E. Fiset.

For the ballot on the amendments to By-Laws:—Messrs. M. B. Atkinson (Chairman), W. N. Dietrich, A. J. Meyers, W. D. Lawrence.

The Secretary then made announcements as to the excursions in connection with the Meeting.

The Report of the Council, which had been distributed in advance of the meeting was, on the motion of Mr. Phelps Johnson, seconded by Mr. W. D. Lawrence, taken as read and received.

REPORT OF COUNCIL FOR THE YEAR 1914

The Council presents the following report on the work of the Society during the past year:

Roll of the Society.

The elections during the year were as follows:—Thirty-eight (38) Members, forty-six (46) Associate Members, one (1) Associate, sixty-three (63) Juniors, one hundred and sixty-nine (169) Students.

The transfers during the year were as follows:—Twenty-nine (29) Associate Members to the class of Member, twenty-one (21) Juniors to the class of Associate Member, one (1) Student to the class of Member, twenty-six (26) Students to the class of Associate Member, forty-eight (48) Students to the class of Junior.

Twenty deaths have been reported, and there have been removed from the rolls by resignation and on account of non-payment of dues, or on account of failure to apply for transfer to an appropriate grade: Five Members, nine Associate Members, four Associates, six Juniors and thirty-eight Students.

At present the membership stands as follows:—

Hon. Members	10
Members	674
Associate Members	1,372
Associates	36
Juniors	352
Students	615
Total	3,059

The membership of the Branches at the date of the last Annual Meeting was as follows:—

	Corporate.	Non-Corporate.	Total.
Quebec	59	40	99
Ottawa	159	48	207
Kingston	15	16	31
Toronto	119	58	177
Manitoba	117	40	157
Calgary	45	9	54
Vancouver	113	29	142
Victoria	49	14	63
	676	254	930

The resignations noted on the previous page have been due chiefly to the fact that the gentlemen in question have ceased to be actively engaged in engineering work, but also, unfortunately, in a few cases to inability to pay subscriptions as a result of lack of employment.

The twenty members who have been removed from the rolls of the Society by death are the following:—

Hon. Members.....	His Excellency The Right Honourable the Earl of Minto, G.C.M.G., LL.D., P.C.
	The Right Honourable Lord Strathcona and Mount Royal, G.C.M.G., LL.D. (Hon. Cantab.)
Members.....	William Crawford
	Edmond R. Gabbett
	John Galbraith, M.A., LL.D., (Past President and Hon. Councillor)
	Hamilton McM. Killaly
	Alex. King Kirkpatrick
	Alfred Noble
	Walter Ambrose Pearson
	Alexander Stewart
	Edmond Bonner Temple
	G. Herbert Webster
Associate Members...	J. T. M. Burnside.
	Alex. Campbell
	Jeremiah Gallagher
	A. H. Larochelle
	Ernest E. Malvern
	Roderick J. McD. Parke
	Thomas H. Schwitzer
Associate.....	The Hon. William Gibson

Annual Meeting

The twenty-eighth Annual Meeting was held at 176 Mansfield Street, Montreal, in January, 1914, under the presidency of Mr. Phelps Johnson.

The first session was called to order on Tuesday, January 27th, at 10.30 a.m., and the meeting was adjourned on Thursday afternoon, January 29th.

Meetings

The Council has held sixteen meetings during the year. There have been six sectional meetings, nine monthly meetings, and four Junior Section meetings of the Society.

The following papers and addresses were presented:

Monthly Meetings:

"St. Lawrence River Bridge," by Mr. P. B. Motley, M.Can. Soc.C.E.

"Building Substructures, Built by the Pneumatic Method," by Mr. John W. Doty, M.Can.Soc.C.E.

"Pulp and Newspaper Manufacture," by Mr. J. Stadler.

"Subaqueous Tunneling," by Mr. P. A. N. Seurot, M.Can. Soc.C.E.

"Concrete Highway Construction," by Mr. L. S. Bruner, A.M. Can.Soc.C.E.

"Road Improvement in the Province of Quebec," by Mr. G. Henry, A.M.Can.Soc.C.E.

"Fire-Control in Relation to Military Rifle Fire," by Dr. A. C. Geddes.

"The System of Unit Construction in the Concrete Power-House at Cedars, Que.," by Mr. J. E. Conzelman.

"Mushroom Construction," by Mr. C. A. P. Turner, A.M.Can. Soc.C.E.

"An Integrating Weighing Machine for Materials in Motion," by Mr. H. E. T. Haultain, M.Can.Soc.C.E.

"The Wielder of the Weapon," by Mr. H. E. T. Haultain, M. Can.Soc.C.E.

"Methods of Treatment of Sewage Sludge," by Mr. P. Gillespie, A.M.Can.Soc.C.E.

Electrical Section:

"A Brief Summary on the Performance of Electrical Insulators," by Mr. J. C. Smith, M.Can.Soc.C.E.

"Making our Water Powers Valuable," by Mr. A. Surveyer, M. Can.Soc.C.E.

Mechanical Section:

"Steel Car Shops at Angus," by Mr. L. C. Ord.

"Steel Passenger Car Frame Construction," by Mr. C. Brady.

"Talk on Heavy Artillery," by Lieut. S. T. Layton, A.M.Can. Soc.C.E.

Mining Section:

"The Electrical Driving of Winding Engines and Rolling Mills," by Mr. C. A. Ablett, A.M.Inst.C.E., and Mr. H. M. Lyons, A.M.Inst.E.E.

"The Evolution of Stoping Methods in Mining during the Last Decade," by Mr. C. A. Macaulay, S.Can.Soc.C.E.

"Top Slicing System of Mining as Practised at the Mines of the Detroit Copper Company, Morenci, Arizona," by Mr. J. R. McLean, S.Can.Soc.C.E.

"Modern Artillery in the Field," by Lieut. S. L. Brunton.

Junior Section:

"Contracts and Costs of Brick Veneer Building Construction," by Mr. J. H. Norris, S.Can.Soc.C.E.

"Movable Bridges," by Mr. J. Robertson, S.Can.Soc.C.E.

"The Moose Jaw Water Supply System," by Mr. R. M. Walker, Jr.Can.Soc.C.E.

"The Substructure of the Fraser River Bridge at Fort George," by Mr. H. L. Bodwell, A.M.Can.Soc.C.E.

Branch Societies

The several Branches of the Society, their Headquarters and Officers at this date are as follows:—

Vancouver —Headquarters, Metropolitan Building.
Chairman, G. R. G. Conway.
Sec.-Treas., J. R. Grant.

Manitoba —Headquarters, University of Manitoba, Winnipeg. (Address Box 2918).
Chairman, E. E. Brydone-Jack.
Sec.-Treas., G. E. Bell.

Toronto —Headquarters, Engineers' Club, King Street West.
Chairman, A. F. Stewart.
Sec.-Treas., J. S. Galbraith, 9 Rowanwood Ave.

Ottawa —Headquarters, 110 Carling Avenue.
Chairman, G. A. Mountain.
Sec.-Treas., A. B. Lambe.

Kingston —Headquarters, School of Mines.
Chairman, A. Macphail.
Sec.-Treas., L. W. Gill.

Quebec —Headquarters, City Hall. (Address Box 115).
Chairman, A. Amos.
Sec.-Treas., J. des R. Tessier.

Victoria —Headquarters, 534 Broughton Street. (Address P.O. Box 1290).
Chairman, F. C. Gamble.
Sec.-Treas., R. W. Macintyre.

Calgary —Headquarters. (Address Box 2318).
Chairman, H. B. Muckleston.
Sec.-Treas., P. M. Sauder.

Edmonton —Headquarters, University of Alberta. (Address Box 957).
Chairman, W. Muir Edwards.
Sec.-Treas., L. B. Elliot.

Committees.

The following have been the Committees of Council during the year:—

Library and House Committee:

H. M. MacKay, Chairman.
F. P. Shearwood.
A. Surveyer.
R. A. Ross.
A. Stansfield.

Finance Committee:

C. N. Monsarrat, Chairman.
G. H. Duggan.
W. J. Francis.
H. Holgate.
E. Marceau.

Gzowski Medal and Prizes for Students' Papers:

R. A. Ross, Chairman.
C. H. Rust.
W. F. Tye.
Phelps Johnson.
H. M. MacKay.
J. M. R. Fairbairn.
R. J. Durley.
J. B. Porter.
J. de G. Beaubien.

Officers of Sections

General:

W. J. Francis, Chairman.
E. Brown, Vice-Chairman.

Electrical:

R. M. Wilson, Chairman.
J. C. Smith, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
R. A. Ross, Vice-Chairman.

Mining:

J. B. Porter, Chairman.
H. E. T. Haultain, Vice-Chairman.

Committee on Publications:

R. A. Ross, Chairman.
H. M. MacKay.
J. M. R. Fairbairn.
R. J. Durley.
J. B. Porter.
J. de G. Beaubien.

Committee on Meetings:

W. J. Francis, Chairman.

The Chairmen and Vice-Chairmen of Sections, the Chairmen of Branches and the following members:—

R. McColl.
R. B. Rogers.
P. Gillespie.
J. C. Dufresne.
R. O. Wynne-Roberts.
A. J. Latornell.
F. X. A. Leofred.
C. H. Mitchell.

The Board of Examiners for admission of candidates under by-laws 8 and 9 was as follows:—

H. M. MacKay, Chairman.
A. Surveyer, Secretary.
R. S. Lea.
H. P. DePencier.
A. M. Gray.
P. E. Mercier.
J. Flahault.
M. Beullac.

The following have been the Committees of the Society during the year:—

The Nominating Committee for Officers and Members of Council for the year 1915:

J. Duchastel de Montrouge, Chairman, representing District No. 1
C. H. Rust, Past President of the Society.
W. F. Tye, " " " " "
Phelps Johnson, " " " " "
J. S. O'Dwyer, representing District No. 2.
R. A. Black, " " " 3.
L. W. Gill, " " " 4.
J. G. G. Kerry, " " " 5.
J. S. Dennis, " " " 6.
F. F. Busteed, " " " 7.

Cement Specifications:

J. A. Jamieson, Chairman.
C. H. Rust.
D. MacPherson.
C. E. W. Dodwell.
W. P. Anderson.
F. P. Gutelius.
J. S. Dennis.
H. Holgate.
P. A. N. Seurot.

Improved Engineering Service:

H. Holgate, Chairman.
A. W. Campbell.
J. A. Jamieson.
F. L. Wanklyn.
G. J. Desbarats.
A. St. Laurent.
L. A. Vallee.
H. J. Lamb.

Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
J. B. Porter.
H. Holgate.
H. Irwin.

Sewage Disposal:

R. S. Lea.
John Kennedy.
W. Chipman.
C. H. Rust.
W. Muir Edwards.
J. O. Meadows.
A. Surveyer.
A. F. Macallum.
A. J. McPherson.
P. Gillespie.
W. S. Lea.

Steel Bridge Specifications:

C. N. Monsarrat, Chairman.
F. P. Shearwood.
J. G. LeGrand.
R. F. Uniacke.
G. H. Duggan.
N. M. McLeod.
H. G. Kelley.
W. A. Bowden.
P. B. Motley.
F. C. McMath.

Conservation:

James White, Chairman.
C. R. Coutlee.
H. F. Laurence.
R. McColl.
R. O. Sweezey.
W. H. Breithaupt.
G. A. Bayne.
A. J. McPherson.
J. S. Dennis.
J. B. Hegan.
C. E. W. Dodwell.
A. E. Doucet.
R. S. Lea.
R. W. Leonard.
E. E. Brydone-Jack.
W. R. W. Parsons.
John Chalmers.
T. H. Tracy.
J. B. Challies.
C. H. Mitchell.
Wm. McNab.

The Electro-Technical Commission:

L. A. Herdt, Chairman.
O. Higman.
H. T. Barnes.
L. W. Gill.
W. A. Duff.
L. A. Rosebrugh.
J. Kynoch.
J. Murphy.
A. B. Lambe.

Rails:

H. G. Kelley, Chairman.
G. A. Mountain.
M. J. Butler.
J. M. R. Fairbairn.
A. F. Stewart.

Track, (Fastenings, Tie Plates and Ties):

H. R. Safford, Chairman.
F. P. Gutelius.
A. C. Mackenzie.
E. W. Oliver.
D. MacPherson.
S. B. Clement.
C. B. Brown.
R. L. Latham.
A. Crumpton.
R. M. Hannaford.
Chas. Warnock.
J. G. Sullivan.
A. F. Stewart.
W. A. Bowden.

Reinforced Concrete:

W. J. Francis, Chairman.
P. M. Morssen.
C. N. Monsarrat.
H. M. MacKay.
P. B. Motley.
E. Brown.
S. Baulne.
E. S. Mattice.
E. Brydone-Jack.
H. Rolph.
P. Gillespie.

General Clauses for Specifications:

H. Holgate, Chairman.
E. G. M. Cape.
R. De L. French.
W. Chipman.
J. G. G. Kerry.

Cast Iron Water Pipes and Specials:

F. H. Pitcher, Chairman.
T. C. Irving, Jr.
N. J. Ker.
A. Currie.
C. H. Mitchell.
F. X. A. Leofred.
C. L. Fellowes.

The awards of the Gzowski Medal and of prizes for the best students' papers will, in accordance with the practice of previous years, be announced during the meeting.

The following is a statement of elections which have taken place since the issue of Bulletin No. 10:

August 18th, 1914.

Members:

Elgee, H. A.
Meurling, H. F. V.
Newman, R. L.

Associate Members:

Cook, W. A. M.
Dann, E. M.
Lembcke, R. E.
Murphy, C. J.
Weeks, A. B.
White, C. E.

Juniors:

Angell, H. G.
Cummiford, S. A.
Flitton, R. C.
Junkin, R. L.
Lamb, G. J.
Laurence, Wm. S.
Leishman, J. A.
O'Neill, H. J.
Ross, H. T.
Stanley, H. P.

Transferred from Associate Member to Member:

Brown, F. B.

Transferred from Junior to Associate Member:

Faus, H. W.
White, Robert.

Transferred from Student to Associate Member:

Macdonald, W. M.
Manson, A. B.
Nourse, A. E.

Transferred from Student to Junior:

DeValter, R. A.
Ewart, D. M.
Lacroix, P. A.
Lefebvre, H.

Students:

Brecht, J. F.
Ferguson, A. D.
Mathews, J. E.

September 21st, 1914.

Members:

Atwood, W. S.
Eddy, A. C.
Hayward, R. F.
Hillman, D.
Manchester, C. S.

Associate Members:

Babcock, J. B.
Bergoust, O. J.
Cook, F. L.
Ellis, J. G. St. G.
Goodwin, W. R.
Reoch, A. E.
Rounthwaite, C. H. E.
Smith, Wm. C.
Smither, Wm. J.

Associate:

McGuire, F. C.

Juniors:

Bonn, W. E. M.
Fairn, A. S.
Fife, W. M.
Keemle, R.
Menzies, A. F.
Moxon, G. B.
Nicholson, J. B.
Saint-Laurent, J. B. O.
Smith, D. R.
Stairs, G. S.
Warner, W. W.

Transferred from Associate Member to Member:

Challies, J. B.
Daw, Hilder.
Ferguson, A.
MacLeod, G. R.

Transferred from Junior to Associate Member:

Rinfret, C.
Smith, K. H.
Street, J. C.

Transferred from Student to Associate Member:

Gordon, M. L.
Morrison, J. R.
Taunton, A. J. S.

Transferred from Student to Junior:

Ferguson, A. W.
Ford, W. S.
Forest, A.
Letson, J. E.
Mauer, E.
White, D. A.

November 17th, 1914.

Members:

Hanington, C. F.
Houston, G. N.
McLean, H. A.
Thorne, B. L.
Yorston, W. D.

Associate Members:

McLachlan, J. B.
Meek, V. M.
Montague, T. M.
Talman, S. G.

Juniors:

DesRosiers, A.
Draper, W. H.
Ferris, C. B.
McLaren, A. A.
McLeod, C. K.
Powell, R. W.
Wade, M. L.

Students:

Derrer, L. H.
Dickson, W. S.
Flint, C. D.
Grant, W. R.
Lyons, E. L.
Macdonald, C. A.
Mahaffy, H. L.
McCully, R. C.
McIntyre, J. R.
Mooney, F. M.
Perry B. R.
Richardson, A. A.
Weir, F. E.
Williscroft, G. M.
Wilson, A. L.
Wilson, J. C.

Transferred from Associate Member to Member:

Ford, A. L.
Girdwood, E. P.
Grant, J. R.

Transferred from Student to Associate Member:

Gilchrist, J. M.
Hutchison, A.
MacDiarmid, A. A.
Wood, J. R.

Transferred from Student to Junior:

Brown, E. C.
Edwards, H. L.
Fisken, A. D.
Hay, W. W.
Inness, R. D.
Jarman, P. E.
Lariviere, A.
Passy, P. de L. D.
Roy, A.
Sullivan, A. W.
Turner, G. R.

December 15th, 1914.

Members:

Japp, H.
Sands, E. E.

Associate Members:

Cahan, J. F. F.
Cowin, Jas.
Dawes, A. S.
Engholm, F. G.
Mathieson, D. M.
Theriault, L. L.

Juniors:

Allen, B.
Legris, Jos.

Students:

Carnsew, C. N. T.
Eadie, R. S.
Gibbs, C. R.
Gray, R. W.
Johnston, H. W.
Lafoley, L. H.
Neilson, S. A.
Richardson, S. S.
Rochester, L. B.
Smith, H. F.

Transferred from Associate Member to Member:

Beullac, M. J.
Mackenzie, H. A.

Transferred from Junior to Associate Member:

Jamieson, E. A.
Kydd, Geo.

Transferred from Student to Associate Member:

Chene, J. D.
Randolph, T. G.

General

The routine work of the Council has been dealt with in the usual manner.

The following matters which have received attention during the year would seem to be especially worthy of note.

The instructions of the Annual Meeting in regard to the various Committees reporting to the Annual Meeting were carried out as promptly as possible. The Committees appointed by Council, together with those re-appointed at the last Annual Meeting, are given on Pages 5 to 10 of this Report. No action was taken by Council as to Testing Laboratories, the Committee in regard to which was discontinued by the Annual Meeting. Shortly after the list of Committees had been completed, a circular letter was addressed to them to the effect that their reports should be submitted to the Council before November 30th, in order that these might be printed and sent out to the membership; that failing this it would be impossible to give the subjects committed to them satisfactory consideration at the Annual Meeting.

Under the instructions of the Annual Meeting the resolution in regard to the co-ordination of surveys was duly transmitted to the Dominion Government and the receipt thereof acknowledged. The Council regrets that there does not seem to have been any advance made by the Government in this important matter.

Acting in conjunction with the Institution of Naval Architects, the Institution of Civil Engineers and other British and foreign associations, the Council took steps towards assisting in the establishment of a Memorial to the late Sir William White, Honorary Member of this Society. A circular letter in regard thereto was

sent to the members of the Society on June 12th, and as a result subscriptions towards the Memorial to the amount of $230.65 were received and forwarded to the Secretary of the Memorial Committee in London.

In view of the resolution of the Annual Meeting regarding the subject of Datum Planes, to which the attention of the Society was called by the British Columbia Branches, the Council has, after some consideration, placed itself on record as of the opinion that the same plane of reference should, if at all practicable, be employed throughout the North American Continent. As this would involve consultation with the United States Coast and Geodetic Survey, the Secretary was instructed to seek the co-operation of Dr. W. F. King as the officer in charge of Geodetic Surveys of Canada.

There has been an interchange of views between the Council and the Vancouver and Victoria Branches as to the proposed Summer Convention of 1915, but no definite plans have been made on account of the unsettled conditions arising from the war. The suggestion of the Western Branches is that the month of June would be a suitable time for the Convention, and that such meetings as might be held should be in Victoria. On adjournment, Vancouver and engineering works in its neighborhood should be visited.

The Council desires once more to call the attention of members to the importance of contributing papers for the Transactions of the Society. In July last the Chairman of the Committee on Papers addressed a circular letter to corporate members and in connection therewith presented a list of subjects in the various departments of engineering which might serve as suggestions for the titles of communications. The Council has pleasure in recording the fact that a number of important papers have been contributed during the year, but would urge the membership to reflect that the present is an opportune time for them to make a record of the important works upon which many of them have been engaged. In this connection the Council is of opinion that a more complete co-operation by the Branches is desirable and practicable.

The fact that the papers presented to the Society and read at Montreal during the present session have been of the highest interest is attested by the circumstance that the audiences have been the largest in the history of the Society.

A complete list of the Branches is given elsewhere, and the Council has pleasure in recording the fact that a Branch has been established during the past summer in Edmonton under the Chairmanship of Professor W. Muir Edwards.

As a result of representations by the British Columbia Branches to the Government of the Province, the members of this Society have under the Provincial Water Act been specially recognized, and it is understood that efforts are being made to secure a similar recognition by the Government of Saskatchewan.

The Council has, during the year, named delegates to several Congresses, prominent among which were the International Conference on City Planning in Toronto, the Western Canadian Irrigation Association and the Good Roads Congress in Chicago.

A special meeting of Council was again held this year, in conformity with the practice established in 1913, at which an endeavor was made to secure the attendance of Councillors from all the Districts. At this meeting special attention was given to the amendments to By-Laws now being voted upon in regard to Provincial Divisions of the Society, to the Code of Ethics and to an amendment of the By-Laws governing the discipline or expulsion of members. There was a satisfactory attendance, although on account of the disturbed condition of the country the members residing at great distances did not find it practicable to be present at the meeting.

The members of the various grades of the Society who have, up to January 1st, enlisted for active service are as follows:—

Members	11
Associate Members	46
Juniors	29
Students	31
Total	117

In view of representations made, the corporate members of the Society have been invited to subscribe to a Special Fund from which the families of members of the Society who have gone to the war can be assisted in directions to which the resources of general funds may not be applicable. The Council has pleasure in reporting that this Fund now amounts to $2,033.75, and is available for distribution under the direction of a special committee which has been appointed to advise in regard thereto.

Representations have been received from various sources to the effect that the Society should become active in the formation of an Engineering Corps for war services. The Council has signified to the Minister of Militia and Defence its desire to co-

operate in this connection, but the offers made have not as yet been accepted by the Government. A recent communication from the Toronto Branch to the effect that a Special Railway Corps should be organized directly under the British War Office is now under consideration with the idea that action will be taken in accordance with such competent advice as may be obtained from Great Britain.

By special resolution it has been decided to remit the dues of members of the Society actively engaged at the front during the term of their enlistment and a circular letter to this effect has been issued to the membership.

M. J. BUTLER, President.
C. H. McLEOD, Secretary.

January 9th, 1915.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

The committee considered proposals for improving the acoustics of the lecture hall, but as the accomplishment of this would have involved considerable expenditure, it was decided to take no action for the present. Owing to the large attendance at most of the meetings during the year the acoustical defects were less noticeable than on some previous occasions.

Requests for exchange of publications were made by several Institutions, and exchanges were arranged in the case of the following:—

University of Western Australia,
University of Notre Dame, Indiana, U.S.A.
Department of Mines, Ottawa.

It was also agreed to exchange House Privileges with the Engineers' Club, Dayton, Ohio.

The Encyclopaedia Britannica, 11th Edition, was purchased and constitutes the most notable single addition to the library during the year.

Presentations to the Library were made by the following members:—

F. W. Cowie, M.Can.Soc.C.E.
H. E. Harcourt, Jr.Can.Soc.C.E.
J. B. Harvey, A.M.Can.Soc.C.E

S. E. Junkins, M.Can.Soc.C.E.
F. C. Kunz, M.Can.Soc.C.E.
G. A. Mountain, Past President Can.Soc.C.E.
W. A. Plant, S.Can.Soc.C.E.
W. F. Richardson, M.Can.Soc.C.E.
R. M. Roy, M.Can.Soc.C.E.
A. Surveyer, M.Can.Soc.C.E
Sir Wm. Van Horne, Assoc.Can.Soc.C.E.

The following additions were made to the Library:—

"Past, Present and Future of Railway Clubs." By D. M. Brady.
"Twentieth Annual Report of the Massachusetts Highway Commission." 8vo. cloth, Boston, 1912.
Presented by THE MASSACHUSETTS HIGHWAY COMMISSION.

"Report of Transit Commissioners, City of Philadelphia." Vols. I. and II. Quarto Bds., Philadelphia, 1913.
Presented by A. MERRITT TAYLOR.

"Fallacy of Deep Sea Erosion Theory." By. G. O. Case.
Presented by THE AUTHOR.

"Coast Sand Dunes, Sand Pits and Sand Wastes." By G. O. Case. Nar. 12mo. cloth, London, 1914.
Presented by THE AUTHOR.

"Coast Erosion and Foreshore Protection." By J. S. Owens and G. O. Case, 8vo. cloth, London, 1914.
Presented by G. O. CASE.

"Report on Blackwell's Island Bridge." By F. C. Kunz, M.Can Soc.C.E.
Presented by THE AUTHOR.

"City of New York, Department of Bridges Annual Report" for the Year ending December 31st, 1913. 8vo. cloth, 128 pp.
Presented by HON. F. J. H. KRACKE.

"Liquid Steel: Its Manufacture and Cost." By D. Carnegie and S. C. Gladwyn, 8vo. cloth, 505 pp., New York and London, 1913.
Presented by S. E. JUNKINS, M.Can.Soc.C.E.

"Report of Railway Commissioners of Canada," Ottawa, 1913 Cl. O.
Presented by G. A. MOUNTAIN, Past President, Can.Soc.C.E.

"Proceedings of the Institution of Civil Engineers," Vols. 41, 43/47 and 52/58.

"A Treatise on Astronomy." By Hugh Godfray, London, 1894.

"The Engineering Works of the Kistna Delta." By G. T. Walch, Vol. I. Madras, 1899. Nar. Q. Cloth, 191 pp.

"Report on Water Power for Transmission to Mexico City." By H. L. Cooper, New York, 1902. Q. Leather.

"North America in South America, A Description of the Sao Paulo Electric Plant at Parnahyba," New York, 1902. Folio Leather.

"Electrical and Magnetic Calculations." By A. A. Atkinson, New York, 1902. Nar. 12mo., 310 pp.
Presented by MRS. P. A. PETERSON.

"The Effects of Errors in Surveying." By Henry Briggs, London, 1912. 12mo. Cloth, Duplicate.

"Text Book of Theodolite, Surveying and Levelling." By James Park, London, 1911. 12mo. Cloth.
Presented by J. B. HARVEY, A.M.Can.Soc.C.E.

"La Technique de la Houille Blanche." By E. Pacoret, 2 Vols. Paris, 1911. 8vo. Cloth, 2 Vols.
Presented by A. SURVEYER, M.Can.Soc.C.E.

"Reinforced Concrete Construction." By G. A. Hool, 2 Vols., New York and London, 1912.

"Hydraulic Turbines." By R. L. Daugherty, 2nd Edition, New York and London, 1914.

"Transformer Practice." By W. E. Taylor, 2nd Edition, New York and London, 1913.

"Excavating Machinery." By A. B. McDaniel, 340 pp. 8vo. Cloth, New York and London, 1913.

"Design of Plate Girders." By L. E. Moore, 8vo., 283 pp. Cloth, New York and London, 1913.

"Efficiency as a Basis for Operation and Wages." By H. Emerson, 12mo. Cloth, 180 pp. 3rd Edition, New York, 1912.

"Suspension Bridges, Arch Ribs and Cantilevers." By W. H. Burr, 8vo. Cloth, 417 pp. 1st Edition, New York and London, 1913.

"A Text Book of Trade Waste Waters." By H. M. Wilson and H. D. Calvert, 8vo. Cloth, 340 pp. London, 1913.
Presented by W. F. RICHARDSON, M.Can.Soc.C.E.

"Rainfall Reservoirs and Water Supply." By Sir Alex. Binnie, New York and London, 1913.
Presented by H. E. HARCOURT, Jr.Can.Soc.C.E.

"Elements of Specification Writing." By R. S. Kirby, New York, 1913.
Presented by W. A. PLANT, S.Can.Soc.C.E.

"Report on Halifax Harbor." By F. W. Cowie, M.Can.Soc.C.E. Ottawa, 1913.
Presented by THE AUTHOR.

"Report of Georgian Bay Ship Canal," 1908.

"Report of Transit Commissioner, City of Philadelphia." 1913, 2 Vols.

"Pennsylvania State Railroad Commission." Vol. 1911.
Presented by SIR WM. VAN HORNE, Assoc.Can.Soc.C.E.

Two Photographs of the Canadian Pacific Railway Bridge near Trenton, Ont.
Presented by R. M. ROY, M.Can.Soc.C.E.

"Encyclopaedia Britannica." Eleventh Edition.
Purchased.

"American Hand Book for Electrical Engineers." By H. A. Pender, New York and London, 1914.
Purchased.

"The Heat Treatment of Tool Steel." By H. Brearly, London and New York,-1911.
Purchased.

The following is a complete list of periodicals, magazines, transactions, etc., regularly received and on file in the library.

Those marked † are paid for; all others are exchanges.

Those marked * are bound at the end of each year and placed on the shelves in the General Reading Room.

*American Society of Civil Engineers, Transactions and Proceedings, *New York.*

*American Society of Mechanical Engineers, Transactions, *New York.*

*American Society for Testing Materials, *Philadelphia.*

American Institute of Architects, Journal of, *Washington.*

*American Institute of Electrical Engineers, Transactions and Proceedings, *New York.*

*American Institute of Mining Engineers, Transactions, *Philadelphia.*

American Railway Engineering Association, *Chicago.*

American Water Works Association—Proceedings.

Anales de la Secretaria de Communicaciones y Obras Publicos, *Mexico.*

"Antonio Alzate" Scientific Society, Transactions, *Mexico.*

Australian Inst. of Mining Engrs.

Association of Engineering Societies, Journal of, *New York.*

Association of Ontario Land Surveyors, Annual Report, *Toronto.*

Barge Canal, Bulletin, *New York.*

Bibliographie des Sciences et de l'Industrie, *Paris.*

Board of Water Supply of the City of New York, *New York.*

Boletin de Ingenieros, *Mexico.*

Boston Public Library, Bulletin and Annual Report, *Boston.*

Boston Society of Civil Engineers, *Boston.*

Brooklyn Engineers' Club, Proceedings, *Brooklyn.*

Builders' Bulletin, *Montreal.*

Bureau of Railway Economics, *Washington.*

Bureau of Standards, Bulletin, *Washington.*

Bureau of Mines, *Washington, D.C.*

Bureau of Mines, Report, *Canada.*

Bureau of Railway Economics, *Washington.*

*Canadian Engineer, *Toronto.*

Canadian Electrical News, *Toronto.*

*Canadian Institute, Transactions, *Toronto.*

Canadian Machinery and Manufacturing News, *Toronto.*

†Canadian Magazine, *Toronto.*

Canadian Manufacturer, *Toronto.*

Canadian Mining Institute, Transactions, *Montreal.*

Canadian Mining Journal, *Montreal* and *Toronto.*

Canadian Municipal Journal, *Montreal.*

Canadian Patent Office Record, *Ottawa.*

Canadian Railway and Marine World, *Toronto.*

Carnegie Library of Pittsburg, *Pittsburg.*

"Central" Magazine of City and Guilds Central Technical College, *London, Eng.*

†Century, The, *New York.*

†Chambers' Journal, *London, Eng.*

Cincinnati Public Library, *Cincinnati.*

Cleveland Engineering Society Journal and Transactions, *Cleveland.*

*Cleveland Institute of Engineers, Transactions, *Middlesborough*

Colorado School of Mines, Bulletin, *Golden, Cal.*

Construction, *Toronto.*

Contract Record, *Toronto.*

Cornell Civil Engineer, *Ithaca, N.Y.*

Crerar Library Reports, *Chicago.*

Department of Colonization, Mines and Fisheries, *Quebec*

Department of Marine and Fisheries, *Ottawa.*

Department of Mines, *Ottawa.*

Department of Naval Service, *Canada.*

Department of Public Works, *Ottawa.*

Department of Railways and Canals, *Ottawa.*

Department of the Interior, *Ottawa.*

Electric Journal, *Pittsburg.*

†Electric Railway Journal, *New York.*

Electrical Review and Western Electrician, *Chicago.*

Electrical Review, *London, Eng.*

Electrical World, *New York.*

Engineers' Club, *Baltimore.*

*Engineers Club of Philadelphia, Proceedings, *Philadelphia.*

*Engineers' Association of New South Wales, Transactions, *Sydney.*
Engineers' Society of Western Pennsylvania, Proceedings, *Pittsburg.*
Engineering & Contracting, *Chicago.*
*Engineering News, *New York.*
†Engineering and Mining Journal, *New York.*
†*Engineer, *London, Eng.*
*Engineering, *London, Eng.*
Engineering Magazine, *New York.*
*Engineering Record, *New York.*
Engineering Review, *London, Eng.*
Engineering Standards Committee Reports, *London, Eng.*
Ferro Concrete, *London, Eng.*
*Franklin Institute, Journal of, *Philadelphia.*
Geological Survey of Western Australia, Miscellaneous Reports.
Halifax City Engineer's Report, *Halifax.*
Harbour Commissioners' Report, *Montreal.*
†Harper's Monthly Magazine, *London* and *New York.*
Heating and Ventilating Magazine, *New York.*
†Illustrated London News, *London, Eng.*
De Ingenieur, *Gravenhage.*
Indian Engineering, *Calcutta.*
Industrial Engineering and the Engineering Digest, *New York.*
Institute of Mining and Metallurgy, *London, Eng.*
*Institution of Civil Engineers, Transactions, *London, Eng.*
Institution of Civil Engineers of Ireland, Transactions, *Dublin.*
*Institution of Mechanical Engineers, Transactions, *London, Eng.*
Institution of Naval Architects, *England.*
*Institution of Engineers and Shipbuilders in Scotland, Transactions, *Glasgow.*
*Institution of Electrical Engineers, Transactions, *London, Eng.*
International Conciliation, *New York.*
International Waterways Commission, *Ottawa.*
Interstate Commerce Commission, *Washington, D.C.*
†Iron Age, *New York.*
*Iron and Steel Institute, Transactions, *London, Eng.*
*Junior Engineering Society, Transactions, *London, Eng.*
†La Lumiere Electrique, *Paris.*
La Technique Moderne, *Paris, France.*
*Liverpool Engineering Society, Transactions, *Liverpool.*

†London Magazine, *London.*
A Magyar Mernok-es Epitesz-Egylet, *Budapest.*
Master Car Builders' Association, Proceedings, *Chicago.*
†McClure's Magazine, *New York.*
Mechanical Engineer, *Manchester.*
Mining and Metal. Soc. of America.
*Mining Institute of Scotland, Transactions, *Hamilton, Scot.*
Mining Science, *Denver.*
Mining Society of Nova Scotia, Journal, *Halifax.*
Monthly Weather Review, *Washington.*
Municipal Engineering, *Indianapolis.*
New Orleans Sewerage and Water Board, Report, *New Orleans.*
New York Department of Health, *New York.*
North of England Institute of Mining and Mechanical Engineers, *Newcastle-on-Tyne, Eng.*
North East Coast Institution of Engineers and Shipbuilders, Transactions, *Newcastle .*
Nova Scotia Institute of Science, *Halifax.*
Ontario Bureau of Mines, *Toronto.*
†Outing, *London, Eng.*
Page's Weekly, *London, Eng.*
Patent Office Library, Reports of, *London, Eng.*
*Philosophical Society of Glasgow, Transactions, *Glasgow.*
Pocket List of Railroad Officials, *New York.*
Providence, City of, Annual Report, *Providence.*
Professional Memoirs, Corps of Engineers, U. S. Army.
Public Health Journal, *Toronto.*
†Punch, *London, Eng.*
Practical Engineer and Engineer's Gazette, *London, Eng.*
Railway Commissioners of Canada, Report of Board, *Ottawa.*
Railway and Engineering Review, *Chicago.*
Railway Engineering and Maintenance of Way Journal, *Chicago.*
Railway and Locomotive Engineering, *New York.*
Railway Age Gazette, *Chicago.*
Railway Master Mechanic, *Chicago, Ill.*
Revista Technologico Industrial, *Barcelona.*
Royal Artillery, Journal of the, *Woolwich.*
Royal Society of Canada, Transactions, *Ottawa.*
Royal Engineers' Institute, Journal, *Chatham, Eng.*
Royal Institute of British Architects, Transactions, *London, Eng*
Royal United Service Institution, Journal, *London, Eng.*
Royal Dublin Society, Proceedings, Scientific and Economic, *Dublin.*

Royal Society of Arts, Journal, *London, Eng.*
*Royal Society of Edinburgh, Proceedings, *Edinburgh.*
Royal Scottish Society of Arts, Journal, *Edinburgh.*
School of Mines, Quarterly, Columbia College, *New York.*
†Scribner's *New York.*
†Sketch, *London, Eng.*
Smithsonian Institution, Reports, *Washington.*
Sociedad Cubana de Ingenieros, *Havana, Cuba.*
Societe Scientifique Industrielle de Marseilles, *Marseilles.*
Societe Industrielle de l'Est, *Nancy, France.*
Societe Industrielle du Nord de la France, *Lille, France.*
Societe des Ingenieurs Civils, *Paris.*
*Society of Engineers, Transactions, *London, Eng.*
Society of Naval Architects and Marine Engineers, Transactions, *New York.*
*South Wales Institute of Engineers, Proceedings, *Cardiff, Wales.*
Statistical Year Book of Canada, *Ottawa.*
†Strand Magazine, *London, Eng.*
The Steamship, *London.*
Technical Index, *London, Eng.*
Times Engineering Supplement, *London, Eng.*
Tijdschrift van het Koninklijk Instituet van Ingenieurs, *Gravenhage.*
Toronto, City Engineer's Report, *Toronto.*
U. S. Army, Corps Engineers—Professional Mem., *Washington, D.C.*
U. S. Army—Report, Chief Engineer, *Washington, D.C.*
U. S. Artillery Journal, *Fort Monroe, Va.*
U. S. Geological Survey Reports, *Washington, D.C.*
U. S. Naval Institute, Proceedings, *Annapolis.*
U. S. War Dept., Annual Report, *Washington.*
Valve World.
Western Australian Institution of Engineers, *Perth, Australia.*
*Western Railway Club, Proceedings, *Chicago.*
Western Society of Engineers, Journal, *Chicago.*
†Windsor Magazine, *London, Eng.*

University Publications:
Dalhousie University, Calendar, *Halifax.*
McGill University, Calendar, *Montreal.*
University of California, Chronicle, *Berkeley, Cal.*
University of California, Publications, *Berkeley, Cal.*

University of Illinois, Bulletin, *Urbana, Ill.*
University of Manitoba, *Winnipeg, Man.*
University of North Dakota, Quarterly Journal, *North Dakota.*
University of Toronto, Trans. Engineering Soc., *Toronto.*
University of Wisconsin, Bulletin, *Madison, Wis.*
University of Missouri, Engineering Quarterly, *Columbia, Mo.*

Respectfully submitted,

H. M. MACKAY,
Chairman

January 9th, 1915.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

Report of the Treasurer.

The financial statements submitted to the Annual Meetings for several years past, have been highly satisfactory; but the same cannot be said of the year 1914.

While the statement for 1913 showed an excess of receipts over expenditure amounting to $646.00, we closed the year just ended with a deficit of $3,394.

This state of affairs is due to several causes, chief among which are: the cost of printing the Transactions, which, for the first part of 1914, were unusually voluminous; the increased amount of rebates to branches of the Society, and the maintenance of our new premises.

While the Society's affairs cannot be said to be in a bad way, it must be admitted that they are not flourishing, and, in this connection, it seems in order to call attention to the fact that arrears of members' fees are increasing in an alarming manner.

At the end of 1913, there was due the Society, under that head, no less than $9,553.00. Of this amount, $3,297.00 were collected during 1914, but the balance still unpaid is very much too large, and this is thought an opportune time to remind members generally, that annual dues are practically our only source of revenue, and to urge upon all the absolute necessity of regularly paying their dues, in order properly to maintain the Society.

Ernest Marceau,

Treasurer.

Montreal, January 14th, 1915.

CANADIAN SOCIETY OF CIVIL ENGINEERS.
STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDING 31ST DECEMBER, 1914.

Receipts

SUBSCRIPTIONS—		
Arrears of Fees Collected	$ 3,297.58	
Current Fees	15,615.69	
Advance Fees	270.35	
Entrance Fees	2,895.00	
		$22,078.62
INTEREST—		
Savings Bank Account	$ 12.53	
Special Deposit Receipt	146.30	
Overdue Fees	156.03	
		314.86
Sales of Transactions and Periodicals		129.75
DIVIDENDS—		
Can. Per. & West. Can. Mtg. Co. stock	$ 22.50	
Montreal Light, Heat & Power Co. stock	20.00	
		42.50
Forward		$22,565.73

Expenditure

INTEREST—		
On Mortgage to 31st Dec., 1914	$1,200.00	
On Bank Overdraft	1.38	
		$ 1,201.38
Printing and Stationery, including Transactions		10,551.06
Books, Magazines and Library Expenses		259.45
Postage, Post Cards and Telegrams		1,837.25
Salaries of Secretary and Office Staff		4,531.50
Caretaker's Wages		1,120.00
Taxes		1,253.80
Water Rates		194.00
Expenses—Annual Meeting	$ 98.50	
Expenses—Ordinary Meetings	462.04	
Expenses—Board Meetings	54.70	
		615.24
Coal and Wood		432.16
Electric Light and Power		186.85
Gas		29.45
Repairs and House Supplies		507.47
Insurance		169.35
Telephone—Rent and Tolls		116.45
Cabs, Cartage, etc.		6.30
Forward		$23,011.71

CONTINUATION OF

STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDING 31ST DECEMBER, 1914.

Receipts	
Carried forward	$22,565.73
	$22,565.73

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A., *Auditors.*

Montreal, 13th January, 1915.

Expenditure		
Carried forward		$23,011.71
Sundries		153.49
Auditors		150.00
Bank Commission		31.48
Legal Expenses		37.66
Examinations—less Receipts		222.00
Students' Prizes		50.00
Gzowski Medal		7.85
REBATES OF FEES TO BRANCH SOCIETIES—		
Toronto	$429.25	
Quebec	240.75	
Winnipeg	396.00	
Ottawa	567.75	
Vancouver	297.00	
Kingston	45.00	
Victoria	178.75	
Calgary	141.50	
		2,296.00
TOTAL EXPENDITURE ON REVENUE ACCOUNT		$25,960.19
BALANCE—Being excess of Expenditure over Receipts on Revenue Account for year ending 31st December, 1914.....		3,394.46
		$22,565.73

CANADIAN SOCIETY OF CIVIL ENGINEERS.
STATEMENT OF ASSETS AND LIABILITIES AS AT 31ST DECEMBER, 1914.

Assets.

PROPERTY ACCOUNT—		
Balance at 31st December, 1913	$88,873.46	
Expended during year	168.18	
		$89,041.64
FURNITURE—		
Balance at 31st December, 1913	$ 2,762.58	
Added during year	643.30	
	$3,405.88	
LESS 10% written off for Depreciation	340.58	
		3,065.30
BOOKS—Estimated value		6,150.00
ARREARS OF FEES—Estimated value		5,000.00
CANADA PERMANENT & WESTERN CANADA MORTGAGE CORPORATION STOCK		180.00
MONTREAL LIGHT, HEAT & POWER CO. STOCK		120.50
GOLD MEDAL		45.00
LOAN TO OTTAWA BRANCH		300.00
CASH ON HAND		176.34
BALANCE IN BANK OF MONTREAL		3,385.91
Forward		$107,464.69

Liabilities.

PRIZE FUND ACCOUNT		$ 468.77
ROYAL INSTITUTION FOR THE ADVANCEMENT OF LEARNING—		
Mortgage on Mansfield St. Property at 6%	$20,000.00	
Interest accrued thereon to date	200.00	
		$20,200.00
ACCOUNTS PAYABLE		4,941.93
SUNDRY REBATES DUE TO BRANCHES		1,087.75
Forward		$26,698.45

CONTINUATION OF
STATEMENT OF ASSETS AND LIABILITIES AS AT 31ST DECEMBER, 1914.

Assets		*Liabilities*		
Carried forward	$107,464.69	Carried forward		$26,698.45
		SURPLUS—		
		Balance at 31st December, 1913 ...	$84,351.28	
		Deduct Expenditure on Revenue Account $25,960.19		
		Less Receipts on Revenue Account. 22,565.73		
			3,394.46	
			$80,956.82	
		Estimated value of Books added to Library	150.00	
			$81,106.82	
		LESS—Written off for Depreciation on Furniture 10%	340.58	
				80,766.24
	$107,464.69			$107,464.69

Montreal, 13th January, 1915.

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

Obituaries

STRATHCONA, THE RIGHT HON. LORD, AND MOUNT ROYAL, G.C.M.G., LL.D., P.C., Hon. M.Can.Soc.C.E., was born 6th August, 1820, at Forres, Morayshire, Scotland. In 1838, as Donald Smith, he came to Canada as a cadet in the service of the Hudson Bay Co., and for 14 years, he was in charge of a trading post in the wilds of Labrador. From Labrador, he went to what was called at that time the North West Territories, where he became Chief Factor and later Resident Governor and Chief Commissioner over the entire Hudson Bay Territory.

As a public man and statesman, Lord Strathcona first came into prominence in connection with the insurrection known as the Red River Rebellion in 1869 when he was appointed special commissioner by the Government to enquire into the circumstances which led to the uprising of Louis Riel and his followers.

In 1871, he was elected to the Manitoba Legislature for the City of Winnipeg, and for twenty years thereafter was a prominent figure in the politics of Canada.

Lord Strathcona's name is indissolubly associated with Railway development in Canada, and with the building of the Canadian Pacific Railway in particular. In acknowledgment of his services and labors in connection with this railway, he was knighted by the late Queen Victoria in 1886.

In 1896, he retired from Canadian political life and was appointed to represent the Dominion in London as High Commissioner, a post which he held until the time of his death. At the time of this appointment he became a member of the Imperial Privy Council, and in 1897 was created Baron Strathcona and Mount Royal.

Many University honors were conferred upon Lord Strathcona because of his interest in the cause of education. In addition to his other activities, he was chancellor to two Universities, and was a patron of numerous colleges and educational institutions.

As a patron of art, he was well known. Together with Lord Mount Stephen, he endowed a Canadian scholarship in the Royal College of Music, London, and later endowed one on his own account. His collection of pictures has been called "the most catholic and abundant in Canada."

During the South African War, he raised and maintained throughout the time of their service, a mounted regiment from Western Canada, known as the "Strathcona Horse," a corps whose name became a synonym for daring, bravery and valor.

Lord Strathcona was the author of two important works "Western Canada Before and Since Confederation" and "The History of the Hudson Bay Company."

As a most princely benefactor, he will probably be longest remembered. To the newer generation in Canada, his great exploits in the fields of politics and finance mean only brilliant incidents in the history of the Dominion, but to the man on the street to-day the name of Strathcona probably immediately conjures up an impression of a man who gave away millions. His private and unostentatious charities for the relief of the oppressed were without number, and of only a few of his public benefactions has any record been kept. On the occasion of the Queen's Jubilee in 1887, he, with Lord Mount Stephen, gave a million dollars for the building and endowment of the Royal Victoria Hospital at Montreal, which sum was supplemented with a further donation of $800,000 for maintenance. To McGill University alone, he has given over two million dollars. In 1896 he erected and endowed the Royal Victoria College in affiliation with McGill for the higher education of women.

Of his more recent benefactions, he gave nearly half a million to promote the introduction of military training in the Canadian Public Schools; one million to the King Edward Hospital Fund; and large donations to other hospitals and Y.M.C.A. buildings, etc., all over Canada. His ever ready cheque has meant much to hundreds of clergymen all over the Dominion.

As High Commissioner for Canada, Lord Strathcona has left a shining example of public spirit and personal self-sacrifice.

His death occurred in England on the 21st of January, 1914.

MINTO, HIS EXCELLENCY THE RIGHT HON. THE EARL OF, G.C.M.G., LL.D., P.C., Hon. M.Can.Soc.C.E., was born in 1847. He was educated at Eton and Cambridge, and had a brilliant career as a soldier. In 1871, he was in Paris during the Communist uprising. He followed the Carlist Army in Spain as a war correspondent. He witnessed the operations of the Turkish Army on the Danube, and was present during the bombardment of Nokopolis and the historic crossing of the Danube. He was with General Roberts in the Afghan campaign, and later served as his secretary in South Africa. He fought the Egyptians as a Captain of mounted infantry in 1882, and was severely wounded at Magfar. Later,

he became military secretary to Lord Lansdowne, the Governor-General of Canada, and during this service helped to put down the North-West Rebellion as chief of staff under General Middleton. On his return to his native land, he served as Brigadier-General of voluntary infantry in Scotland.

In 1898, Lord Minto was appointed Governor-General of Canada, which position he held until 1904. Many events of great interest affecting Canada and the Canadian people took place during his term of office, the most important of which was the outbreak of the South African War.

In 1907, Lord Minto was appointed Viceroy of India, which is the most important and lucrative post in the British Colonial Governments. He closed his long public career in 1909, when he resigned from the Viceroyalty.

He died in London on 1st March, 1914.

DUFFY, AMBROSE, M.Can.Soc.C.E., was born at Newton Stewart, Scotland, 8th January, 1844. He studied for seven years under Willet & Co., Civil Engineers, Aberdeen, Scotland. Mr. Duffy came to Canada in 1867, and was first employed under the City Surveyor of the city of Montreal. In 1872, he was on the staff of the North Shore Railway as Assistant Engineer. From 1873 to 1881, he had charge of all the survey works of the late H. M. Perrault, Architect and Surveyor for the City of Montreal. He later went to Ottawa and was engaged as Division Engineer from Casselman to Ottawa on the Canada Atlantic Railway. During 1883-8, Mr. Duffy held important engineering positions on the Gatineau Valley Railway, the Pontiac and Pacific Railway, and on Government surveys under Mr. Collingwood Schreiber. In 1888 he became Assistant City Engineer at Ottawa, which position he held until 1892. From that time until his death which occurred on 26th July, 1914, he was Chief City Assessor of Ottawa.

Mr. Duffy became a member of the Canadian Society of Civil Engineers within a month of its inception.

GABBETT, EDMOND RICH, M.Can.Soc.C.E., was born in Limerick, Ireland, 28th February, 1851. He was educated in Ireland and later was a pupil with R. Stephenson and Co., Newcastle-on-Tyne, England. In 1876, Mr. Gabbett was appointed superintendent and manager of the erection of various chemical works in England, Belgium, France, Spain and Canada for Messrs. Burt, Boulter and Haywood, of London, England. He was a member of the Institute of Civil Engineers of London.

He died in January, 1914.

GALBRAITH, JOHN, M.Can.Soc.C.E., was born in Montreal, 5th December, 1846. After receiving his primary education at Port Hope Grammar School, Dr. Galbraith entered Toronto University and graduated as a B.A. in 1868. He was awarded the gold medal in mathematics and the Prince of Wales prize. He took his M.A. degree in 1876. It was through Dr. Galbraith's persistent efforts that the Legislative Assembly sanctioned the establishment of the well-known School of Practical Science. Upon the establishment of the school, he assumed the full responsibility of instruction in engineering, and for twenty-five years was instrumental in training men who have since proved a strong factor in the development of Canada. In recognition of his work as an educationalist and engineer, both Toronto and Queen's Universities conferred upon him the honorary degree of LL.D. In the year 1906, the School of Practical Science became the Faculty of Applied Science and Engineering of the University of Toronto, of which Dr. Galbraith was appointed Dean.

Outside of his college work, Dr. Galbraith had a notable career as an engineer. He was engaged on the construction of the Intercolonial Railway and of the Midland Railway extension to Sudbury. His extensive knowledge of the geographical and geological nature of the country was acquired by canoe and trail, years before other white men had penetrated into the Indian's domain. In 1907, he was appointed a member of the Commission to investigate and report upon the collapse of the Quebec Bridge.

In 1909, he was elected President of the Canadian Society of Civil Engineers having been associated with it since its inception.

Dr. Galbraith will be perhaps best remembered as a teacher. He possessed to a remarkable degree the faculty of imparting knowledge to others, and was beloved and revered by all his students.

He died at Go Home on 22nd July, 1914.

GARDEN, JAMES F., M.Can.Soc.C.E., was born at Woodstock, N.B., 19th February, 1847. His first engineering experience was on the Northern Railway of Canada extension. He was afterwards engaged on the location of the Credit Valley Railway. For eight years Mr. Garden was employed by the Dominion Government as a D.L.S. outlining townships. He moved to Vancouver in 1888 and engaged in private practice as a D.L.S. He was chief engineer of the first Vancouver Street Railway.

Mr. Garden took a great interest in politics, and represented the City of Vancouver in the Provincial Legislature for many years.

He was senior partner in the firm of Garden, Taylor, Roberts and Hawkins at the time of his death, which occurred in Vancouver on 9th December, 1914.

KILLALY, HAMILTON MCMURRAY, M.Can.Soc.C.E., was born at St. Joseph, Mo., 25th July, 1871. He received his early education at Trinity College School, Port Hope, Ont., and later at McGill University from which he graduated in 1896. Mr. Killaly was from the date of his graduation until 1899 with the C.P.R. in many responsible positions.

During the Boer war, he enlisted with the Second Canadian Mounted Rifles, and served through the campaign with his regiment.

Returning to Canada in 1902, he again joined the engineering staff of the C.P.R. and was engaged on reconnaissance from Yahk to Spokane. In 1903 he made a reconnaissance for the Sudbury-Kleinburg Branch, and immediately followed this with a preliminary survey and location of the same line from Romford to Bolton. Early in 1905 he returned to Montreal to complete his plans and data and was then appointed assistant engineer at Toronto. During this same year, Mr. Killaly made a reconnaissance for the Georgian Bay and Seaboard Railway, located a line from Bathurst to Tiffin, and followed this by the location of the Georgian Bay and Seaboard Railway as Assistant Engineer in charge of parties in the field. On completion of these surveys in 1906, he was transferred to the Montreal office as Assistant to the Division Engineer of Construction and in the year 1911 was appointed Engineer of Surveys for Eastern Lines, which position he resigned in 1913 to join the Government Railways as Engineer of Construction.

Although Mr. Killaly had not quite reached the age of forty-three when his life's work was ended, his had been a life of important achievements, and many fine stretches of railway in Canada are the result of his unerring accuracy of reconnaissance, and his genius for locating his line whether on prairie or mountain. His ability to withstand privation on survey trips was proverbial among engineers. Shortly after his government appointment, his health broke down, no doubt superinduced by the hardships he suffered in the Boer war.

He died in Montreal on the 18th of March, 1914.

KIRKPATRICK, ALEXANDER KING, M.Can.Soc.C.E., was born at Kingston, 14th April, 1861. He graduated from the Kingston Royal Military College in 1882. Mr. Kirkpatrick spent many years on railway work, principally with the Canadian Pacific Railway in various responsible capacities. His work with this company covered

points from the Atlantic to the Pacific Coast. For some years past Mr. Kirkpatrick had been Professor of Civil Engineering at Queen's University, Kingston.

He died in May, 1914.

NOBLE, ALFRED, M.Can.Soc.C.E., born at Livonia, Mich., U.S.A., 7th August, 1844. From 1862 to 1865, he served in the Civil War. He was educated at the University of Michigan, from which he graduated in 1870, with degree of C.E. He later received the degree of LL.D. from this University, and also from the University of Wisconsin.

Mr. Noble was Assistant Engineer on river and harbor works on the Great Lakes for two years, and filled positions of trust on bridge and railway work from 1870 to 1894. In 1895, he was appointed a member of the Nicaragua Canal Board by President Cleveland. In 1899, President McKinley appointed Mr. Noble a member of the Isthmian Canal Commission, which was charged with the selection of the best canal route across the American Isthmus, and it has been substantially on the route selected by this commission that the Panama Canal has been constructed. In 1905 President Roosevelt appointed him a member of the International Board of Engineers to recommend whether the Panama Canal should be constructed as a sea level or a lock canal. In 1907, Mr. Noble was one of the three appointed to visit the Panama Canal to investigate the conditions regarding the foundations of some of the principal structures. In addition to the work connected with the appointments mentioned, Mr. Noble was engaged in practice as a Consulting Engineer under the firm name of Noble & Woodard. He was for a time Consulting Engineer to the Quebec Bridge Board, also Consulting Engineer for the Board of Water Supply, New York City, and for many other Public Service Commissions.

Mr. Noble has been President of the American Society of Civil Engineers, of the Western Society of Engineers, and of the American Institute of Consulting Engineers. He was elected an Hon. Member of the Institute of Civil Engineers of London, Eng.

He received several medals in recognition of his notable achievements as a Civil Engineer.

He died in New York, 19th April, 1914.

PEARSON, WALTER AMBROSE, M.Can.Soc.C.E., was born at Putnam, Conn., 3rd July, 1869. He graduated from Tufts College, Mass., as A.B. in 1890. After graduation he was employed by the West End Railway Co., of Boston, Mass., for three years. In 1893

he went to Brooklyn to take charge of the electrification of the Brooklyn Heights Ry. In 1895 he was engaged on the electrical installation and construction of power stations and substations, and the electrification of lines and equipment of cars for the Metropolitan Street Ry. Co., of New York. This position he occupied until 1905. Mr. Pearson came to Niagara Falls in 1905 as Mechanical and Electrical Engineer for the Electrical Development Co. of Ontario. In 1906, he was appointed Chief Engineer of this company, and also of the Toronto and Niagara Power Co. He was also Consulting Engineer for various companies and corporations. He was a member of the Institute of Civil Engineers, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and various other scientific bodies.

He died in New York on 25th January, 1914.

STEWART, ALEXANDER, M.Can.Soc.C.E., was born 23rd April, 1854. Mr. Stewart had been for twenty years identified with the Great Northern Railway at Seattle, Wash., and at the time of his death held the position of Assistant Chief Engineer of that railway. Extensive improvements in the west were carried on under his direction, including the tunnel under the City of Seattle, concrete snowsheds in the Cascades, and terminal improvements at many points.

Prior to his service with the Great Northern, Mr. Stewart was Chief Engineer of the Duluth and Winnipeg Railway. He located the Portage la Prairie line for the Provincial Government of Manitoba, and he also located the Prince Edward Island Railway for the Dominion Government.

He died in Seattle on 6th June, 1914.

TEMPLE, EDMUND BONNOR, M.Can.Soc.C.E., was born 1st December, 1837. After receiving his education and degree as a Civil Engineer in Quebec, Mr. Temple was engaged on preliminary survey of the Sorel and Drummondville Railway. He was later connected with the North Shore Railway, and the Newfoundland Railway. From 1881-3 Mr. Temple was Resident Engineer, Toronto, Grey & Bruce Railway, and from 1883 to 1888 was Assistant Engineer on Ontario division of C.P.R. Shortly after this date, he was appointed a Government Engineer, his work consisting chiefly of harbor development and general construction work at Toronto Island. For nine years he has held the office of harbor master at Port Arthur, but retired from active work about a year before his death, which occurred on March 17th, 1914.

WEBSTER, GEORGE HERBERT, M.Can.Soc.C.E., was born at Creemore, Ont., 31st January, 1857. For the greater part of his engineering life, Mr. Webster was connected with Railway work. From 1879 to 1882, he was Assistant Engineer Northern, Hamilton and Northwestern Railways. He held the office of Assistant Engineer of the Manitoba and Northwestern Railway, and later was appointed Engineer-in-charge of the same road. From 1900 to 1905, he occupied various positions of trust on the Canadian Pacific Railway, the last of which was as Division Engineer in Vancouver. In 1905 he retired from railway work to become President and Engineer of the British Columbia General Contract Co., of Vancouver. Some five years ago, he resigned this position and carried on a private practice as an Engineer and Contractor.

He died at Vancouver, 27th December, 1914.

BURNSIDE, JOHN THRIFT MELDRUM, A.M.Can.Soc.C.E., born at Toronto, 29th June, 1874. Mr. Burnside was a Post Graduate in Applied Science, University of Toronto. For two years following his post graduate work he held the position of Fellow on the staff of the Department of Applied Science, University of Toronto. He then obtained an Imperial Commission, and was sent to the Gold Coast, West Africa, where he spent three years, part of which time he acted as Commandant. Returning to Canada in 1905, he took a position on the construction of the James Bay Railway, (now C.N.O. Ry.), near French River. He was transferred from this point in May, 1906, to St. Casimir, P.Q., when the Canadian Northern commenced the construction of the Garneau-Quebec line. He was resident engineer in charge of the construction of the line at that point. Later in the same year he occupied the position of engineer for the contractor on the Guelph, Goderich division of the C.P. Ry. at Goderich. In 1907 he accepted a position as engineer in charge of construction on the Canton-Hankow Railway in China, in which capacity he had charge of some very creditable work. He remained in China until June, 1909, returning to Canada after a short visit in the Straits Settlement and in India. Shortly after his return he became interested in mining work in Cobalt, Gowganda and Kirkland Lake districts. He disposed of his holdings and spent some months in Europe. After his return he went to the Southern States for his health, and finally moved to Asheville, where his death occurred on 2nd December, 1914.

Mr. Burnside was widely known as an expert on Rugby football, and it was through his efforts that the old style of massed play was discarded and the Burnside Rules adopted with some modifications.

Associated with Colonel W. R. Lang, Mr. Burnside was largely responsible for the creation of the Canadian Field Engineers, and until he left for the Gold Coast, he held a commission in that corps. He was widely and popularly known in many places, having travelled extensively both before and after entering professional work.

CAMPBELL, ALEXANDER, A.M.Can.Soc.C.E., was born 14th September, 1875. He graduated from the Faculty of Applied Science, McGill University, in 1897, and spent the following eight years as a Patent Examiner in the Department of Agriculture. He later became General Superintendent of the International Marine Signal Co. After ten years' service with this company, he was appointed Vice-President and General Manager of the Campbell Steel & Iron Works, Limited, Ottawa.

When volunteers were called for the first Canadian Contingent, he organized a company of Field Engineers for active service, and while in training at Valcartier contracted an illness which resulted in his death on 19th October, 1914.

GALLAGHER, JEREMIAH, A.M.Can.Soc.C.E., was born in Ireland, 4th April, 1839. He came to Canada in 1860, and was for a number of years a Professor of English and Mathematics at St. Anne's College, Quebec. At a later date, he entered the employ of the Quebec Corporation as City Waterworks Engineer, which position he had held for forty years.

His death occurred at Montreal on 20th July, 1914.

MALVERN, ERNEST EDWIN, A.M.Can.Soc.C.E., was born 23rd December, 1874. He was educated at Bristol University. While in England Mr. Malvern was employed as Assistant Engineer in the Bridge Department of the Great Western Railway Co. He came to the United States some years ago, where he was engaged on survey work. In 1908, he came to Canada and joined the engineering staff of the Dominion Bridge Co., Montreal. He was later engaged both in Canada and in the United States on the design and erection of many large reinforced concrete buildings. In 1911 Mr. Malvern returned to Montreal and was employed by Messrs. Metcalf & Co., and the Canada Cement Co., on the design of steel and concrete structures.

He died in Montreal on 24th February, 1914

PARKE, R. J. McD., A.M.Can.Soc.C.E., born 6th April, 1874. At the time of his death, Mr. Parke was Managing Director of the

Automatic Electric Cook Co., Limited, of Toronto. He was the designer of the first long distance transmission plant in Canada, which was from the Ragged Rapids, on the Severn River, to Orillia. Mr. Parke reported on the cost of distributing electricity throughout Toronto, and this report was used in part when the design now in operation was being prepared. He was in charge for the Dominion Government of the design and construction of the lighting and power system for the Welland Canal. He was formerly head of the firm of Parke and Leith, an agency for the British Aluminium Co., Limited, and as a result of his labors in this industry, he founded the Canada Wire & Cable Co.

He died on 25th August, 1914.

SCHWITZER, THOMAS H., A.M.Can.Soc.C.E., was born 28th August, 1878. He graduated from McGill University as B.Sc. in 1901. His first position of importance was as engineer-in-charge of the erection of a steel dipper dredge, tow boat, etc., for the Egyptian Government. Mr. Schwitzer was for three years Assistant Superintendent Montreal Harbor Works. He was later engaged as Factory Engineer by the Northern Electric Company which position he held for two years. For nearly two years he had charge of the design of central heating plants for the United States Navy Department. Mr. Schwitzer was at the time of his death in charge of all machinery, motors, etc., of the Government Printing Bureau, Ottawa.

He died in Montreal on 15th March, 1914.

GIBSON, WILLIAM, A.Can.Soc.C.E., was born at Peterhead, Scotland, 7th August, 1849. For many years Mr. Gibson took an active part in railway and bridge building in Canada. He had charge of the construction of masonry work on the Grand Trunk Railway System in Canada. He built the approaches and portals of the Sarnia Tunnel and had charge of the doubling of the Victoria Jubilee Bridge at Montreal.

Mr. Gibson was a prominent figure in Canadian politics. He had been a senator for many years before his death which occurred on 4th May, 1914.

BURNHAM, GEORGE HUBER, S.Can.Soc.C.E., born at Toronto, 15th November, 1888. Mr. Burnham was educated at the Royal Military College, Kingston. While working on the Manitoba Hydrographic Survey, he was accidentally drowned in July, 1912.

Discussion on Report of Council.

Mr. W. McNab in discussion of the report made certain suggestions as to verbal changes. On motion by Mr. Phelps Johnson, seconded by Mr. W. D. Lawrence, the Report of Council was adopted. The Report of the Library and House Committee was taken as read and received. Mr. H. M. MacKay moved, seconded by Mr. A. J. Meyers, that the Report be adopted. This motion was carried. The Auditor's report and the Treasurer's statement were received, and on motion by Mr. W. J. Francis, seconded by Mr. E. W. Oliver, were received.

Mr. H. Holgate referred to the large amount of arrears of subscriptions, and moved the following: "The Annual Meeting desires the Council to put forth every effort to reduce the outstanding fees to a minimum and requests that the branches be urged to co-operate to this end." The motion was seconded by Mr. W. J. Francis, who remarked that the matter was one which had received a great deal of consideration by the Council. The situation was a serious one, and the Council, he was sure, would be glad to have the instructions of the Meeting in the premises. After a discussion the resolution was unanimously adopted.

The Financial Report on motion by Mr. H. Holgate, seconded by Mr. Phelps Johnson, was adopted unanimously.

The President stated that the reception of the Reports of the Branches of the Society would be the next matter of business. The following Report of the Vancouver Branch, was read by the Secretary:—

Report of the Vancouver Branch.

On behalf of the Vancouver Branch we take pleasure in submitting the following report for the year 1914:—

The present membership of the Branch is One Hundred and Fifty-one, distributed as follows:—

Members	48
Associate Members	74
Juniors	15
Students	10
Associates of the Branch	4

One member four Associate members, and two Juniors are with the First Canadian Expeditionary Force, Overseas. One member and one student are with the Second Canadian Contingent, and one Associate member is with the Royal Engineers.

We much regret having to record the death during the past month, of James F. Garden and G. H. Webster, Members, Can.Soc. C.E.

Fourteen meetings were held during the year and the following papers, most of them illustrated with lantern slides, were presented.

Jan. 6. "Panama Canal," by E. A. Cleveland, M.Can.Soc.C.E.
" 20. "Sewer Construction," by A. G. Dalzell, A.M.Can.Soc. C.E.
Feb. 3. "The Canadian Northern Pacific Railway Construction," by J. V. Nimmo, M.Can.Soc.C.E.
" 17. Discussion; Proposed Dam at the Second Narrows, Burrard Inlet, opened by J. H. Kilmer, A.M.Can.Soc.C.E.
Mar. 3. "Movable Bridges," by J. R. Grant, M.Can.Soc.C.E.
" 17. "Town Planning," by J. W. B. Blackman, M.Can.Soc. C.E.
Apr. 21. Annual Meeting and Conversazione.
May 15. Election of Officers.
"Harbors of the World," by C. E. Fowler, M.Can.Soc. C.E.
Sept. 2. Meeting for formation of a Field Company of Engineers for Home Defence.
Oct. 29. Chairman's Address; "Influence of Engineers in Modern Warfare," by G. R. G. Conway, M.Can.Soc.C.E.
"Doukhobor Suspension Bridge over the Kootenay River," by J. R. Grant, M.Can.Soc.C.E.
Nov. 19. "Jordan River Power Development, Vancouver Island Power Co.," by C. A. Lee, A.M.Can.Soc.C.E.
Dec. 3. "Fuel Oil and its Application," by J. J. Ferris.
" 11-12. Annual Convention and Dinner of the Victoria and Vancouver Branches in Victoria, B.C.
" 17. "The Substructure of the Pitt River Bridge," by E. G. Matheson, M.Can.Soc.C.E.

At the meeting of May 15th, the following officers were elected to hold office for the season 1914-15:—

Chairman—G. R. G. Conway, M.Can.Soc.C.E.

Vice-Chairman—H. E. C. Carry, M.Can.Soc.C.E.

Executive—Donald Cameron, M.Can.Soc.C.E., A. D. Creer, M.Can.Soc.C.E., W. A. Clement, M.Can.Soc.C.E., N. J. Ker, M.Can.Soc.C.E.

Secretary-Treasurer—J. R. Grant, M.Can.Soc.C.E.

Auditors—H. P. Archibald, A.M.Can.Soc.C.E., B. R. Warden, M.Can.Soc.C.E.

On October 20th, R. F. Hayward, M.Can.Soc.C.E., was appointed to fill the vacancy caused by the retirement of W. A. Clement.

The library and reading room of the Branch has been moved to the Metropolitan Building, new furniture has been purchased, new books added, and the principal Engineering Magazines kept on file.

G. R. G. CONWAY, Chairman,
J. R. GRANT, Secretary-Treasurer.

On motion by Mr. H. E. T. Haultain, seconded by Mr. E. W. Oliver, this report was adopted.

The following Report of the Toronto Branch was read by Mr. E. W. Oliver:—

REPORT OF THE TORONTO BRANCH.

Attendance and interest have been maintained during the year in a way that is exceedingly gratifying to the Executive of the Toronto Branch of the Canadian Society of Civil Engineers. The year's programme of meetings comprises the following:—

Wednesday, February 11th, 1914.—Luncheon at McConkey's. Speaker, Mr. C. R. Young. Subject, "A Technical Library." Number present, 77.

Wednesday, February 25th, 1914.—Illustrated Lecture in the Chemistry and Mining Building at the University. Speaker, Mr. C. N. Monsarrat. Subject, "The Quebec Bridge." Number present, 235.

Thursday, March 5th, 1914.—Discussion on the Progress Report of the Committee on Reinforced Concrete of the Canadian Society Civil Engineers. Number present, 50.

Thursday, March 12th, 1914.—Luncheon at the Woodbine Hotel. Speaker, Mr. Geo. Powell. Subject, "Municipal Engineering." Number present, 104.

Thursday, March 26th, 1914.—Illustrated Lecture in the Chemistry and Mining Building at the University. Speaker, Mr. J. G. G. Kerry. Subject, "The Proposed Railway Terminal of the T. & N. O. Railway System on James Bay." Number present, 125.

Thursday, April 16th, 1914.—Luncheon at the Military Institute. Speaker, Mr. J. R. W. Ambrose. Subject, "The Engineer and his Work." Number present, 73.

Thursday, April 23rd, 1914.—Illustrated Lecture at the Engineers' Club. Speaker, Mr. J. Keele. Subject, "The Clays and Clay Industries of Canada." Number present, 40.

Wednesday, October 28th, 1914.—Illustrated lecture at the Engineers' Club. Speaker, Mr. J. Roy Cockburn. Subject, "Naval Architecture." Number present, 70.

Saturday, October 31, 1914. The Annual Outing of the Branch. This took the form of an excursion to St. Catharines and the Welland Ship Canal. Number present, 138.

Thursday, November 26, 1914. Smoker and Lecture at the Engineers' Club. Speaker, Mr. A. F. Stewart. Subject, "The Bridges destroyed during the South African War." Number present, 80.

Thursday, December 10, 1914. Illustrated lecture in the Chemistry and Mining Building at the University. Speaker, Mr. C. N. Cauchon, Ottawa. Subject, "Town Planning Problems of the Federal Capital with special reference to its Railway Features." Number present, 50.

Monday, January 18, 1915. Address in the Physics Building of the University. Speaker, Mr. M. J. Butler, President of the Can.Soc.C.E. Subject, "The Relation between the Engineer and the Contractor." Number present, 350. The annual dinner of the Branch was held in the evening of the same day, the guests of the occasion being Mr. Butler, President, and Professor McLeod, Secretary, of the parent Society.

The average attendance at the meetings during the year has been 116.

A gross increase in membership of 80, equal to 37%, has taken place during 1914, as is shown by the following schedule:—

	1914.	1913.
Members	45	42
Associate Members	106	102
Associates	8	8
Juniors	33	28
Students	103	35
	295	215

The retiring executive believe that a new Constitution and new By-laws will regulate procedure and the conduct of business in the meetings of the Branch, and desire to suggest this to their successors in office.

An active Library Committee has been at work during the year with the result that the books of the four libraries, viz.: The Toronto Branch Canadian Society Civil Engineers, the Engineers' Club, the Ontario Society of Architects, and the Ontario Association of Land Surveyors, have been recatalogued, substantial additions thereto have been made and the collection in other ways rendered

available to a larger body of readers than were able previously to make use of it.

The question of permanent quarters for the use of the Toronto Branch is up to the present unsolved. Owing mainly to the financial situation, the plans having in view the acquisition by the Engineers' Club of a commodious building on University Avenue, have been temporarily discontinued. Had these not been interrupted, it was the intention to have housed the Toronto Branch in the proposed new home of the Engineers' Club in accordance with an agreement that would no doubt have worked out satisfactorily to all concerned. In the meantime, the old arrangement with the Engineers' Club continues, whereby for a nominal rental, certain rooms in their quarters remain at the service of the Branch.

Through an arrangement concluded by the Secretary of the Branch with the managers of various works and plants, the visiting of a large number of places of engineering interest by the members of the Branch has been facilitated. By this arrangement, identification passes were issued to applicants and these, when presented by the holders, were duly honored by the works managers and superintending engineers. This feature has been much appreciated by the members, and especially by the students.

In the death of Dr. John Galbraith, which occurred on the 22nd of July last, the Society suffers an irreparable loss. Dr. Galbraith was one of the charter members of the Society, and served as Councillor for many years, and as President in 1908. For thirty-six years Dean Galbraith directed the instruction in the School of Practical Science, and in its successor, the Faculty of Applied Science and Engineering of the University of Toronto. As an educator his ability was widely recognized, and as an engineer he enjoyed the universal confidence of the members of his profession. His contributions to the science of Bridge Engineering contained in the report of the Royal Commission, which investigated the collapse of the Quebec Bridge, will continue to be a "witness to his intellect, his learning, his industry and his courage." While his excellent judgment, his sanity and his thoroughness rendered his opinions valuable on a great variety of subjects, his personality, his diversified interests and his extended human sympathies made him the most companionable of men.

We regret also to report the deaths of Mr. J. T. M. Burnside, A.M.Can.Soc.C.E., and Mr. Roderick J. McD. Parke, A.M.Can.Soc. C.E., both members of the Toronto Branch.

The following gentlemen have been elected to the various committees for the year 1915:—

Chairman—J. R. W. Ambrose.

Council—J. G. G. Kerry, W. A. Bucke, Geo. A. McCarthy, A. F. Stewart, (*ex officio.*)

Secretary—C. H. Fuller.

Library Committee—A. L. Mudge, W. A. Hare, J. R. Cockburn, H. J. Bowman.

Representative for District No. 5 on the Nominating Committee—E. W. Oliver.

A. F. STEWART, Chairman.

Mr. H. E. T. Haultain moved the adoption of the Report, and remarked that a very large amount of work had been done during the year, work which, in his opinion, would benefit the whole Society. Mr. A. F. Stewart, who had been Chairman of the Branch during the year, and Mr. J. S. Galbraith the Secretary-Treasurer, were deserving of special credit for their energetic work. Mr. Haultain referred in feeling terms to the loss the Society had sustained in the death of Dr. Galbraith. The Report was unanimously adopted.

APPENDIX TO THE REPORT OF THE TORONTO BRANCH.

LIBRARY COMMITTEE'S REPORT.

During the year extensive additions have been made to the Library. These consist of 213 Volumes of the Transactions of various Engineering Societies, 7 Volumes of the Engineering Index, 90 Volumes of Engineering Text Books, 17 bound volumes of periodicals, approximately 450 copies of Government, Provincial, Municipal and State reports, and publications of University Experiment Stations, etc., and a set of Standard topographical maps of Canada.

The additions to the library were sufficiently classified by October last to warrant the issue of a library bulletin, which was sent to all members of the Society. The bulletin is incorporated as part of this report.

The Engineers' Club have provided space for the housing of the additional books by means of new book cases containing approximately 60 lineal feet of shelving which has been entirely filled up.

Arrangements are now being made for issuing a printed catalogue of the books in the four libraries mentioned. Copies of this catalogue will be sent to members when ready.

Sixty-three books have been borrowed since October 23rd, mainly by students of the S.P.S., and a few by the older members. Considerable use has been made of the library for consultation purposes, however, no record has been kept of the extent of such use where books are not borrowed. The Committee appreciate very much the various gifts which have been made to the library. Some of these are of considerable value, and a special plea is made to members for further contributions of suitable books, proceedings and reports. The Committee did not depend entirely on their own judgment in the selection of books, but obtained suggestions from many of the members before purchases were made.

As will be seen from the financial statement, a large proportion of the past year's expenditure was made on the Proceedings and Transactions of the various Engineering Societies, British, American and Canadian. The cost of keeping these up to date in future will be comparatively small, so that a larger proportion of the funds will be available for Engineering text books.

Summary of Expenditures of Library Committee, 1914.

Proceedings, Transactions and Reports	$328.04
Books	130.16
The Engineering Index	14.10
Freight, express, postage, cartage and customs brokerage on books, transactions, etc.	16.15
Pamphlet cases	11.03
Binding	48.60
Typewriting, stationery, postage, etc.	26.65
Printing, Bulletin	7.75
Rubber stamp and pad	1.20
Total	$583.68

Library Bulletin.

Since last January there have been added to the Library a considerable number of valuable series of Transactions, Proceedings, Journals and Reports, and, as well, some eighty engineering treatises and text-books. It is the intention of the Library Committee to have a printed catalogue of the whole Library prepared and distributed in the near future, but, in order to encourage the immediate use of the Library, this Bulletin is issued. For the sake of brevity, only the more important series of publications are mentioned specifically.

Those desiring to consult the Library will find at the headquarters of the Branch, 90-96 King Street West, a complete card catalogue according to authors and subjects covering not only the books, periodicals and reports belonging to the Branch, but the libraries of the Engineers' Club, Ontario Association of Architects and Association of Ontario Land Surveyors. To all these libraries members of the Branch have access.

The eighty books added to the Library comprise the most recent works on Bridge Engineering, Cement and Concrete, Ceramics, Chemical Engineering, Electrical Engineering, Foundations, Heating and Ventilating, Highway Engineering, Hydraulics, Mechanical Engineering, Metallurgy, Railway Engineering, Sanitary Engineering, Steam Engineering, Structural Engineering and Water Supply.

The usefulness of the periodic literature in the Library has been considerably increased by the addition of the Engineering Index from 1906 to 1913.

The thanks of the Society are due the following firms and individuals for gifts of books and publications:

To the American Water Works Association for its Proceedings for 1902-1913.

To the Canadian Westinghouse Co. (per Mr. W. M. Andrew) for a bound set of Electric Journal.

To the Electrical News (per Mr. Walter Carr) for 36 volumes on Electrical Engineering subjects.

To the Institution of Electrical Engineers of Great Britain (per Mr. Lawford Grant) for a set of its Journals for 1904-14.

To the Böving Company of Canada and to Messrs. Edmund Burke, W. F. Ferrier, Arthur Hewitt, A. B. Lambe, A. L. Mudge, C. H. Mitchell, H. G. Nicholls, G. G. Powell and Norman Rankin for miscellaneous books, journals and reports.

In order to further extend the usefulness of the Library, it has been decided to allow members of the Canadian Society of Civil Engineers, in any grade, to borrow single volumes for a period not exceeding seven days. A fine of two cents a day will be levied upon any one who fails to return a borrowed volume upon the due date, and the Committee reserves the right to withdraw borrower's privileges from any member failing to comply with the regulations of the Library.

Those wishing to avail themselves of the privileges offered will consult the Librarian, Mr. R. B. Wolsey, or one of his assistants.

The principal series of Transactions, Proceedings, Journals and Reports, added to the Library by the present Committee are as follows:—

American Ceramic Society,
Transactions, 1912-13.
American Concrete Institute (National Association of Cement Users),
Proceedings, 1905-1911.
American Institute of Electrical Engineers,
Transactions, 1912 (to complete set).
American Railway Bridge and Building Association,
Proceedings, 1903-1913.
American Railway Engineering Association,
Proceedings, 1907-1913.
American Society of Civil Engineers,
Transactions, 1904-1913.
American Society of Mechanical Engineers,
Transactions, 1904-1912.
American Water Works Association,
Proceedings, 1902-1914.
Bureau of Mines of the United States,
Selected Bulletins and Technical Papers.
Canadian Society of Civil Engineers,
Transactions, complete set.
Cleveland Engineering Society,
Journals, 1909-1913.
Domionion of Canada, Department of the Interior,
Set of Standard Topographical Maps.
Dominion and Provincial Governments,
Departmental and Special Commission Reports.
Electric Journal,
1906-1913.
Engineering Experiment Station, University of Illinois,
All available Bulletins.
Engineering Experiment Station, Iowa State College of Agriculture and Mechanic Arts,
All available Bulletins.
Engineers' Club of Baltimore,
Monthly Journals, 1912-1914.
Engineers' Society of Western Pennsylvania,
Proceedings, 1904-1913.
Illuminating Engineering Society,
Transactions, 1909-1913.

Institution of Electrical Engineers,
Journals, 1903-1914.

Institution of Mechanical Engineers,
Proceedings, 1905-1913.

National Electric Light Association,
Reports, 1905-1913.

New York City, Board of Water Supply,
Reports, 1906-1912.

New York State Public Service Commission,
Reports, 1909-1912.

New York State Water Supply Commission and Conservation Commission,
Reports for 1910-1912.

North of England Institute of Mining and Mechanical Engineers, 1900-1913.

Wisconsin Railway Commission,
Reports, 1907-1912.

The Committee on the Library,

W. ALMON HARE,
A. L. MUDGE,
C. R. YOUNG, *Chairman.*

The report of the Ottawa Branch was read by Mr. A. B. Lambe.

REPORT OF OTTAWA BRANCH.

On behalf of the Managing Committee of the Ottawa Branch, we take pleasure in submitting the following report for the past year:—

ANNUAL MEETING

This was held as usual in the early part of October last, and resulted in the election of the following officers for the season 1914-15, namely:—

Chairman—A. St. Laurent.

Managing Committee—M. F. Cochrane, for 1914-15; R. de B. Corriveau, for 1914-15-16; W. J. Dick, for 1914-15; Alex. Gray, for 1914-15-16; W. S. Lawson, for 1914-15-16.

Secretary-Treasurer—A. B. Lambe.

The Standing Committees were afterwards appointed as follows, namely:—

Entertainment—W. J. Dick (Chairman), C. R. Coutlee, G. G. Gale.

Papers—W. S. Lawson (Chairman), J. B. Challies, Alex. Gray.

Rooms—M. F. Cochrane (Chairman), W. F. McK. Bryce, R. de B. Corriveau.

The District Councillors are:—D. MacPherson, for 1912-13-14; S. J. Chapleau, for 1913-14-15; R. F. Uniacke, for 1914-15-16.

The District Representative on the Nominating Committee is L. W. Gill, Kingston, Ont.

Membership

As was the case in the year 1913, we have had a great many changes in our 1914 membership, which now stands as follows, the corresponding figures at the end of 1913 being given for comparison. It will be noted that they show a slight decrease during the past twelve months:—

	December, 1913.	December, 1914.
Honorary Members	3	3
Members	51	46
Associate Members	116	113
Ottawa Associates	24	21
Juniors	15	28
Students	28	16
Totals	237	227

We much regret having to record the deaths during the year of three members, namely:—Messrs. Alex. Campbell, Ambrose Duffy and T. H. Schwitzer.

Honor Roll

We are glad to be able to report that many of those enlisting from Ottawa for active service are Members of the Society and of this Branch. The names so far reported to us are:—Messrs. A. A. Anderson, W. E. Blue, J. L. H. Bogart, F. J. Delaute, A. Nowlan, S. D. Parker, R. W. Powell, J. H. Ramsay, J. C Stewart, and R. S. Stronach.

Branch By-Laws

At the Annual Meeting the By-Laws of the Branch were revised in certain particulars, in order to more fully meet present conditions.

Papers and Meetings

As was the case during last year, our Paper Committee has been successful in presenting to the Branch a number of excellent speakers. The following is a list of meetings held in the past twelve months:—

"Some Accessories of a Battleship"—H. A. Dupré, Ottawa.

"Wireless Telegraph"—C. P. Edwards, Ottawa.

"Centrifugal Pumping Machinery"—J. W. Drysdale, Glasgow, Scotland.

"The Welland Ship Canal"—J. L. Weller, St. Catharines, Ont.

"Structural Steel Design"—E. S. Mattice and W. F. Gronau, Montreal.

"The Engineer and the Public"—W. J. Francis, Montreal.

"Naval Guns"—R. M. Stephens, Ottawa.

"Submarines"—P. C. W. Howe, Ottawa.

On some occasions, the audience was too large for the usual branch quarters, and we are indebted for the use of meeting rooms to the Commission of Conservation, the Carnegie Library and the Normal School.

During the first part of the year two papers per month were given, but latterly there was one evening meeting and one luncheon per month, the latter accompanied by a ten-minute address.

Our Managing Committee meets regularly on the Monday preceeding each first monthly meeting, with special meetings at other times if necessary.

Entertainment

In view of general conditions this year it was decided not to have the regular dinner this season, but to have the monthly luncheons referred to above.

Rooms

As the rooms formerly occupied were not very suitable for the purposes of the Branch, they were given up early in the spring, and present conditions do not seem to warrant engaging any others.

In the meantime, as their functions were so interlaced, the Library and Rooms Committees have been merged.

Finances

It is of course to be expected that present conditions will adversely affect our finances, in common with those of all other similar organizations, but notwithstanding the general situation, they are gradually improving.

All of which is respectfully submitted.

A. St. Laurent, Chairman.
A. B. Lambe, Secretary-Treasurer.

On motion by Mr. Lambe, seconded by Mr. A. T. Phillips, the report was adopted.

Mr. L. W. Gill read the following Report from the Kingston Branch:—

Report of the Kingston Branch.

The Executive of the Kingston Branch begs to submit the following report for the year 1914:—

Membership

Members	8
Associate Members	8
Juniors	5
Associates (Branch)	6
Students	15
	42

It is with much regret that we have to note the death of one of our well-known senior members, namely, Prof. A. K. Kirkpatrick. It is also with regret that we note the absence of several of our active members who have volunteered for overseas service in the present war, namely, Major H. T. Hughes, Major Alexander Macphail, Captain Malcolm, and Mr. D. S. Ellis, all of whom are in the Engineering Service. Several others of our membership have taken up military duties in connection with our Home Service.

Under the above circumstances this Branch will probably be excused for not meeting more than once since the war broke out.

Last February Prof. Kirkpatrick gave a very interesting paper on the Prince Edward Island Railway Ferry, which elicited considerable discussion.

Regarding the matter of finances, we may say that we are not under any very heavy obligations. Queen's University has kindly given the use of its Engineering Library free of charge. Under these circumstances we are able to offer small prizes for student papers with the view of encouraging young men to become interested in the Society.

The annual meeting of the Branch was held on January 25th, 1915, and the following officers were elected for the year:—

Chairman—W. P. Wilgar.

Secretary-Treasurer—L. W. Gill.

Executive Committee—E. Harvey, R. O. Sweezy, G. C. Wright.

Respectfully submitted,

A. MACPHAIL, Chairman.
L. W. GILL, Secretary-Treasurer.

On Motion by Mr. Gill, seconded by Mr. F. H. Pitcher, the Report was adopted.

Mr. A. Amos read the following report from the Quebec Branch:—

REPORT OF THE QUEBEC BRANCH.

The Council of the Quebec Branch of the Canadian Society of Civil Engineers presents the following report for the year 1914:—

ROLL OF THE BRANCH.

At present, the membership stands as follows:—

Members	20
Associate Members	41
Associates (Branch)	2
Juniors	14
Students	21
Total	98

The Annual Meeting of the Quebec Branch was held on the 19th January, 1914, under the Presidency of Mr. A. R. Décary.

The following officers were elected:—
President—A. Amos.
Secretary—J. desR. Tessier.
Councillors—Stuart S. Oliver, A. Léofred, Robert A. Black.

The Past Presidents were:—P. E. Parent, W. D. Baillargé, A. R. Décary.

MEETINGS.

The Quebec Branch held six Business Meetings during the year 1914.

Papers, etc., submitted by the Council of the Society and by the different Branches, were discussed.

Two very interesting lectures were delivered during the year: the first by Mr. A. Surveyer, Civil Engineer, of Montreal, on "La mise en oeuvre des chutes d'eau et les prix de revient comparatifs dans divers pays." This paper was later translated into English and read at one of the meetings in Montreal. This lecture was illustrated by lantern slides.

The second lecture was given by Mr. T. A. J. Forrester, Civil Engineer, on "Cast Iron vs Steel Mains for water supply."

During the past year, one candidate, Mr. R. Martin, presented himself for examination in Railway Engineering.

The following are the officers of the Branch for the year 1915:—
President—S. S. Oliver.
Secretary-Treasurer—Ivan E. Vallee.
Councillors—T. A. J. Forrester, Gabriel Henry, J. F. Guay.

Respectfully submitted,

ARTHUR AMOS, Chairman.
J. DESR. TESSIER, Secretary-Treasurer.

On motion by Mr. A. Amos, seconded by Mr. T. A. J. Forrester, the report was adopted.

The Secretary read the following report from the Victoria Branch:—

REPORT OF THE VICTORIA BRANCH.

The Victoria Branch herewith beg to submit their Annual Report for the year 1914.

The Annual Meeting of the Branch was held on December 9th, and the following officers were elected for 1915, namely:—

Chairman—D. O. Lewis.

Vice-Chairman—H. W. E. Canavan.

Treasurer—F. C. Green.

Secretary—R. W. Macintyre.

Executive—A. E. Foreman and A. W. R. Wilby, together with the four officials named above.

Auditors—E. H. Harrison and H. A. Icke.

Legislation Committee—H. W. E. Canavan (Chairman), F. A. Devereux, F. C. Gamble, E. H. Harrison, W. M. Young.

Eight meetings of the Branch were held during the year, with an average attendance of seventeen, and the following papers were given, all being illustrated with lantern slides:—

January 8th—"Some Engineering Works in British Columbia," (2nd part). F. C. Gamble, Vice-President Can.Soc.C.E.

March 12th—"Modern Guns," Captain N. C. Sherman, J.Can. Soc.C.E.

April 9—"Modern Irrigation in British Columbia." H. W. E. Canavan, M.Can.Soc.C.E.

November 17th—"Modern Lift Bridges." J. Lyle Harrington, M.Can.Soc.C.E.

December 11th—"Victoria Breakwater Construction." J. S. MacLachlan, M.Can.Soc.C.E.

New members admitted to the Branch totalled seventeen (17), but the removal of an equal number leaves a net total of eighty (80), which equals that of 1913. The corporate membership was increased by nine (9), whilst Juniors, Students and Associates decreased to the same figure.

Seven (7) evening receptions were held in the Branch rooms during the winter months, which were well attended by members with their families, and have resulted in the promotion of closer intercourse and acquaintanceship, amongst the profession in Victoria.

The Third Annual Convention of B. C. members of the Can. Soc.C.E., was held in Victoria on December 12th, when Mr. G. R. G. Conway, Chairman of the Vancouver Branch, read a paper on "Legislation and the Engineering Profession," which was followed by a most instructive discussion on this subject. During the afternoon the members motored out to the Albert Head Quarries,

where rock for the Victoria Breakwater is being taken out, and were entertained by Mr. H. A. Elgee, Engineer in charge.

The Annual Convention dinner took place at the Empress Hotel in the evening, with an attendance of eighty-three (83) members and guests. Eight (8) members of the Branch have enlisted for service at the front to date, and others expect to follow them shortly.

Respectfully Submitted,

D. O. LEWIS, Chairman.
R. W. MACINTYRE, Secretary.

On motion by Mr. E. Marceau, seconded by Mr. J. A. McCarthy, the report was adopted.

The Secretary read the following report of the Calgary Branch:—

REPORT OF THE CALGARY BRANCH

On behalf of the Calgary Branch we beg to report as follows:—

During the year there were five general business meetings of the Members of the Branch, including the Annual Meeting on December 5th.

The Executive Committee held nine business meetings, and the Committee on Credentials and Applications held five business meetings. In addition to this there was one informal meeting of the members on September 22nd, to arrange for the entertainment of engineer delegates at the International Irrigation Congress.

Eleven dinners were given by the Branch at Cronn's Rathskeller, with speakers as follows:—

Date.	Name of Speaker.	Subject.
Jan. 9.	W. G. Craig, M.Am.Soc. C.E., City Engineer, Calgary, Alta.	"Modern Pavements."
Jan. 23.	S. G. Porter, M.Can.Soc. C.E., Calgary, Alta.	"The Engineer and his Relations to Society."
Feb. 6.	H. A. Moore, M.Can.Soc. C.E., Calgary, Alta.	"Kananaskis Falls Power Development."
Feb. 20.	D. W. Hays, M.Am.Soc. C.E., Medicine Hat, Alta.	"Irrigation Engineering."
Mar. 6.	H. J. Duffield, M.Can.Soc. C.E., Calgary, Alta.	"The Railways of Southern Peru."

Mar. 20.	F. H. Peters, M.Can.Soc. C.E., Calgary, Alta.	"The Georgian Bay Canal."
Apr. 3.	H. B. Muckleston, M.Can. Soc.C.E., Calgary, Alta.	"Movable Dams."
Apr. 9.	W. J. Francis, M.Can.Soc. C.E., Montreal, Que.	"The Engineer and the Public."
Oct. 6.	F. H. Newell, M.Am.Soc. C.E., Washington, D.C.	"Lessons for Engineers."
Oct. 6.	H. N. Savage, M.Am.Soc. C.E., Great Falls, Mont., U.S.A.	" " "
Oct. 6.	D. W. Ross, M.Am.Soc.C.E., San Francisco, Cal., U.S.A.	" " "
Oct. 6.	Wm. Young, M.Can.Soc. C.E., Victoria, B.C.	" " "
Nov. 6.	Wm. Pearce, M.Can.Soc. C.E., Calgary, Alta.	"Irrigation in Egypt."
Dec. 30.	A. H. Clarke, K.C., M.P., Calgary, Alta.	"Drainage Laws."

In addition to this a luncheon was given previous to the Annual Meeting on December 5th, at the Palliser Hotel, at which several of the members of the Branch spoke.

The members of the Branch visited the Canadian Pacific Railway Company's shops at Ogden, on March 6th.

S. G. Porter and B. Russell attended the Convention of the Western Canada Irrigation Association at Penticton, B.C., on August 10th to 12th, as delegates for the Parent Society and H. R. Carscallen attended as a delegate for this Branch.

About twenty members of the Branch attended the sessions of the International Irrigation Congress on October 5th to 9th, the Secretary of the Branch being authorized to appoint all of them delegates for the Branch, by special arrangement with the Executive of the Congress.

The dinner on October 6th was given for the members of the profession who were delegates to the Irrigation Congress. There were seventy-seven engineers present, of whom twenty-one were guests of the members of the Branch.

It may be worthy of mention that the Council of the City of Calgary asked the Branch to select one of its members for appointment to the Committee selected by the Council to revise the build

ing code of the City of Calgary. As a result, H. B. Muckleston is a member of that Committee.

The Annual Meeting of the Branch was held on December 5th. The Secretary-Treasurer's report at that time showed that the receipts during the year ending November 28th, 1914, had been $157.50, the expenditures $126.60, and that the Branch had a balance of $299.90 in the Molsons Bank. The following officers were elected for the ensuing year:—

Chairman—F. H. Peters.

Secretary-Treasurer—P. M. Sauder.

Executive Committee—R. J. Burley, H. B. Muckleston, and P. J Jennings. (The Chairman and Secretary-Treasurer are ex officio members of this Committee).

Auditors—J. S. Tempest and F. G. Cross.

The present membership of the Branch is sixty-two, distributed as follows:—

Members	13
Associate Members	35
Juniors	3
Students	6
Associates of the Branch	5
	62

Arrangements are being made for a reference library and a register of members who are available for employment.

The members of the Branch have taken a keen interest in the affairs of the Branch and the Society, and the attendance at the dinners has been very good, averaging about forty-five members and guests. The new Executive Committee therefore proposes to continue the programme of fortnightly dinners during the winter months. It is felt, however, that engineers should mix more with men of other professions and business, and the speakers in future will not, therefore, all be members of the engineering profession. In order also to facilitate the business of the Branch, regular business meetings will be held immediately after and at the same place as the dinners.

This Branch feels that the Annual Meetings of the Society should occasionally be held in the West, so as to give all the members of the Society an opportunity to attend at least some of the

meetings, and would like to see arrangements made for next year's meeting to be held in the West.

Respectfully submitted,

F. H. PETERS, Chairman.
P. M. SAUDER, Secretary-Treasurer.

Calgary, January 20th, 1915.

On motion by Mr. R. B. Rogers, seconded by Mr. William Kennedy, the report was adopted.

The Secretary read the report of the Edmonton Branch:—

REPORT OF THE EDMONTON BRANCH.

The Executive of the Edmonton Branch begs to forward herewith report covering the inception and activities of this Branch of the Society up to December 31st last.

This Branch was authorized following a petition of sixteen Corporate Members of the Society residing in this vicinity. An informal meeting was held by those interested in accordance with this authorization on May 7th last, to carry out further steps towards the formation of this Branch. At this meeting the following officers were elected pro tem:—

Chairman—Professor W. Muir Edwards,
Secretary-Treasurer—L. B. Elliot,

and an Executive Committee consisting of the Chairman, Secretary-Treasurer and the following Members: J. Chalmers, J. D. Robertson, W. R. Smith, D. J. Carter, R. H. Parsons. This Executive, as organized, proceeded, following this meeting, to draft by-laws governing the activities of the Branch. These were drawn up and presented for consideration at the first regular meeting of the Branch, which was held in September 23rd last. These by-laws were finally adopted with some amendments at this meeting. The officers elected at the organization meeting were also re-elected to serve until their successors took office at the first Annual Meeting of the Branch. It was further decided at this meeting that future meetings should be held on the first and third Wednesdays of each month, each alternate one to be of a social nature.

At a meeting of the Executive of the Branch, which was held on the 9th of October last, the following Committee on Papers was appointed:—

Chairman—J. Chalmers,
A. J. Latornell,
C. A. Robb.

This Committee has arranged for an interesting series of technical papers to be read each month during the winter season. The following papers of this series have already been delivered at regular meetings:—

"The Prevention of Electrolysis Due to Street Railway Tracks," by R. H. Parsons.

"Depreciation as Applied to Public Utilities," by J. Chalmers.

"The Contribution of Science to Modern Warfare," by Professor W. Muir Edwards.

"Military Engineering," by D. Donaldson.

Several of the above papers were illustrated with lantern slides, and all were of great interest to the Engineers. The programme as arranged for covering this season, calls for three more papers. At the last meeting, which will be held in the month of May, the general business will be taken up relating to the welfare of the Branch and of the Society.

The Branch has taken an active interest in all matters pertaining to the Society as a whole, especially with regard to the proposed by-laws which have been presented for consideration since our organization. We have communicated with and got the views of the various other Western Branches with regard to the matters affecting these Branches, and of the members of the Society in this part of the Dominion.

Our Branch membership is at present as follows:—

Members	9
Associates	1
Associate Members	27
Students	4
Juniors	7
Branch Associates	6

This makes a total membership of fifty-four. We beg to enclose herewith a list of members.

After the organization was effected, the Chairman, Professor W. Muir Edwards, announced that the University of Alberta had granted the use of one of their lecture rooms for the regular meetings of the Branch. Accordingly we have held these meetings since

our organization, at the University. We, however, look forward to the time when the Branch will have rooms of its own with a library in connection, for the use of the Members.

A feature of our programme has been the fortnightly meetings which have taken the form of informal dinners, followed by discussion of Society affairs. We have found that these informal dinners give the Engineers a better opportunity to become acquainted with one another, than is possible at the regular meetings.

As the first Annual Meeting of the Branch will not be held until October next, no report in regard to finances has been prepared.

Respectfully submitted,

W. Muir Edwards, Chairman.
L. B. Elliot, Secretary-Treasurer.

On motion by Mr. E. W. Oliver, seconded by Mr. F. H. Pitcher, the report was adopted.

The Secretary read the following report of the Manitoba Branch:—

Report of the Manitoba Branch.

The Manitoba Branch of the Canadian Society of Civil Engineers begs to submit the following annual report for the year 1914.

The officers for the year 1914 were as follows:—

Chairman—E. E. Brydone-Jack.
Executive Committee—W. L. MacKenzie, F. Lee, D. A. Ross.
Secretary-Treasurer—G. E. Bell.

Meetings.

The following papers were read and discussed at the regular meetings of the Branch:—

Dec. 4, 1913. "Reminiscences," by Mr. T. Turnbull, M.Can.Soc.C.E.

Jan. 8, 1914. "The C.N.R. Bridge over the North Saskatchewan River at Prince Albert," by Mr. W. L. MacKenzie, M.Can.Soc.C.E., and Mr. T. W. White, A.M.Can Soc.C.E.

Feb. 5, 1914. "The Panama Canal," by Mr. H. N. Ruttan, M. Can.Soc.C.E.

Mar. 5, 1914. "Concrete Pavements," by Mr. A. A. Young, A.M.Can.Soc.C.E.

Apr. 2, 1914. "Some Uncertainties in the Design and Construction of Reinforced Concrete," by Mr. H. Edwards, A.M.Can.Soc.C.E.

May 7, 1914. "The Relations of the Engineer to the Public Utility Commission Judge," by Mr. H. A. Robson, Public Utility Commissioner for Manitoba.

Sept. 17, 1914. "Concrete," by Mr. J. H. Fuertes, M.Am.Soc.C.E.

Oct. 8, 1914. "The Winnipeg Water Supply with Especial Reference to the Shoal Lake Project," by Mr. W. G. Chace, M.Can.Soc.C.E.

Nov. 12, 1914. "Some Engineering Experiences in South America," by Mr. D. L. Derrom, A.M.Can.Soc.C.E.

The average attendance at these meetings was thirty-eight.

SECTIONS.

The Electrical Section, the Chairman of which was Prof. E. P. Fetherstonhaugh, held seven meetings during the year, at which papers were read as follows:—

Jan. 25, 1914. "Illumination Calculations," by Prof. E. P. Fetherstonhaugh.

Feb. 11, 1914. "Transmission Line Calculations." Reading of Mr. Julian C. Smith's paper.

Mar. 19, 1914. "Electric Rates," by Mr. R. A. Sara.

May 27, 1914. "High Tension Insulators," by Mr. A. O. Austin.

June 3, 1914. Dinner and Election of Officers.

Oct. 14, 1914. "Storage Batteries," by Mr. J. F. S. Madden.

Oct. 28, 1914. "Electrolysis," by Prof. A. F. Ganz.

The Mechanical Section, Chairman, Mr. A. C. Frith, also held three meetings, at which the following papers were read:—

"Ventilation," by Mr. T. L. Roberts.

"Efficient Shop Methods," by Mr. E. T. Spidy.

"Iron and Steel Manufacture," by Mr. R. R. Neild.

The total membership of the Branch now numbers 297, which is made up as follows:—Members 46, Associate Members 103, Associates 1, Juniors 25, Students 57, Local Associates 65.

The by-laws of the Branch were amended during the year by increasing the time by three months during which meetings would be held, thus making the active season from September to May inclusive.

It was also decided that the officers of the Branch should take office in May instead of in January, although they would still be elected at the annual meeting to be held in December. The officers for 1914 were re-elected to hold office until May, 1915, and the following were elected to hold office from May, 1915, to May, 1916:—

Chairman—W. G. Chace.

Executive Committee—E. P. Fetherstonhaugh, Frank Lee, W. A. Duff.

Secretary-Treasurer—G. E. Bell.

The Treasurer's report showed a balance in hand at the end of the year of $460.29.

GEO. E. BELL, Secretary-Treasurer.

On motion by Mr. W. J. Francis, seconded by Mr. J. A. Burnett, the report was adopted.

The President congratulated the Society on the healthy condition of the Branches as indicated by the reports which had just been read. The improvement in the Toronto Branch was especially gratifying.

Reports of Committees.

The President requested the attention of the Meeting to the reception and consideration of reports of Committees.

Board of Examiners.

Professor H. M. MacKay in presenting the report stated that two members of the Board, Prof. M. C. J. Beullac and Prof. Flahault, were now serving their country in France, and he wished to pay a tribute to their thoughtfulness by stating that before they had left the country they had made every possible provision for carrying on their work during their absence.

Examinations were held in May and November and the following table summarizes the results:—

Subject.	Number of Candidates.	Passed.	Failed.
Elementary Mathematics	3	2	1
Theory and Practice of Engineering	6	6	0
Railway Engineering	4	2	2
Hydraulics	1	1	0
Municipal Engineering	4	4	0
Total	18	15	3

The Board received with regret the resignation of Mr. H. M. Jaquays, M.Can.Soc.C.E., Examiner in Mechanical Engineering, whose advice was of the greatest assistance in the initial stages of the work. Prof. A. R. Roberts kindly undertook the duties of Examiner in Mechanical Engineering for the remainder of the year.

Respectfully submitted,

H. M. MacKay,
Chairman.

On motion by Prof. MacKay, seconded by Mr. F. H. Pitcher, the report was adopted and the Committee continued.

Committee on Cement Specifications.

The President stated there was no report from this Committee. The specifications, which had been prepared some years ago, were out of print, and the Council had asked the Committee to consider the advisability of drafting a revised form of specifications. The

matter of continuing the Committee was now before the Meeting. Mr. John Kennedy said that, in his opinion, the Society should have a set of specifications for Cement which could be used in any contract and referred to as the standard specifications of the Canadian Society of Civil Engineers. The President requested that in view of the opinion expressed a motion to appoint a Committee on Cement Specifications should be made, and asked the Meeting to suggest names of members who would serve on such a Committee. Mr. John Kennedy moved the appointment of the Committee, seconded by Mr. E. Marceau. The motion was put to the Meeting and carried and the personnel of the Committee referred to the Council.

Committee on Improved Engineering Service.

Mr. Holgate as Chairman of this Committee moved, seconded by Mr. Francis, that the Committee be discharged. The motion was carried.

Committee on Educational Requirements.

The report of this Committee was read by Mr. E. Marceau as follows:—

At the Annual Meetings of 1909, 1910 and 1911, the Committee on Educational Requirements made various suggestions both in respect of qualifications for admission and of examinations.

These suggestions having been carried into effect, and an Examining Board appointed in 1912, this Committee has not had any meetings since and, therefore, has nothing to report.

However, if the Annual Meeting so desire it might be continued for another year.

Ernest Marceau, Chairman.

Montreal, January 22nd, 1915.

On motion by Mr. E. Marceau, seconded by Mr. F. H. Pitcher, the report was adopted and the Committee continued.

Sewage Disposal Committee.

This Committee did not present a report. A letter was read from Mr. W. Chipman suggesting the continuation of the Committee. Mr. Kennedy expressed his opinion that the Committee had completed its work for the present. On the suggestion of the President the matter of re-appointing the Committee was referred to the incoming Council.

COMMITTEE ON STEEL BRIDGE SPECIFICATIONS.

The following report was read by Mr. C. N. Monsarrat:—

On behalf of the Committee on Steel Bridge Specifications I beg to report progress.

The specification for Steel Railway Bridges—Fixed Spans, has already been issued, and the Committee now have a draft of specification for Fixed Highway Spans in course of preparation, and hope shortly to be able to submit the same for preliminary distribution and discussion.

I regret that the Committee have not been able to get this out in time for the Annual Meeting.

C. N. MONSARRAT,
Chairman.

The President stated that the proposal of the Committee to prepare a specification for Highway Bridges was most important. He also urged the importance of making any necessary revision of existing specifications on Railway Bridges. On motion, the Committee was continued and instructed to carry out the terms of its report. The President suggested that the Council, with the assistance of the Committee, should take active measures towards securing the adoption of these specifications by the Department of Railways and Canals of the Dominion Government and by the Provincial Governments.

COMMITTEE ON CONSERVATION.

The following report of the Committee on Conservation was presented by Mr. James White and taken as read:—

The Committee on Conservation begs to report as follows:—

The most important matter before us, during the past year, has been the question of the collation and publication of gauge records. When referred to Council in 1913, they requested the Commission of Conservation to undertake this work. Two considerations, however, have, thus far, prevented it advancing beyond the preliminary stages. The first is the fact that the engineer who was entrusted with it has been forced to devote practically all his time to the work of compiling and putting through the press the new edition of the "Altitudes in Canada." This publication has, however, now advanced to a stage that will permit the engineer to give nearly all his time to this important work. The other consideration was the outbreak of the war which forced re-

consideration of the proposal to engage additional assistance, and, until the amount available for the work of the Commission in 1915-16 is determined, it is not possible to incur any new expenditures.

Thus far, the work has been principally confined to the collection of published records of gauge readings, of lists of gauging stations and of organizations, public and private, that have maintained gauges. The extent of the work will necessitate sub-dividing it, probably on an orographical basis. Thus, the Maritime Provinces and the portion of the St. John River basin in Quebec might form one division, the St. Lawrence—except the Ottawa basin, which is sufficiently important to receive treatment as a separate unit—would form another. Similarly with the Saskatchewan, Columbia and Fraser, etc., etc.

(2) *Forest Protection.* In the protection of the forests of Canada, it is a pleasure to report distinct advance. As a result of representations by the Commission of Conservation, legislation was had empowering the Board of Railway Commissioners to prescribe regulations for the operation of locomotives during the dry season. Since these regulations were issued by the Railway Commission in 1912, a remarkable improvemnet has taken place in the railway-fire situation. Since their issuance, they have been enforced in Western Canada and during 1913 and 1914, the organization was extended to Eastern Canada. In the west, an inspection staff, composed of officials of the Department of the Interior and of the Province of British Columbia, has been appointed as officers of the Fire Inspection Branch of the Railway Commission. In the east, officers of the Departments of Lands and Forests of Ontario, Quebec and New Brunswick have been appointed. They have enforced the requirements respecting patrol work and right-of-way clearing along the railways and inspections of fire-protective appliances on locomotives. Thus, the work is carried out by existing fire-protective organizations of the Dominion and Provincial Governments, and duplication of effort is avoided.

When the regulations were approved there was much head-shaking and dire predictions were made that they would impose a severe and an unnecessary burden upon the railways. That these predictions have been falsified is due to the conservative administration of the regulations and to the care taken to endeavor to adjust them to suit the convenience of the railways, provided the public interest does not suffer thereby.

As to results, it is sufficient to quote Mr. H. R. MacMillan, Chief Forester of British Columbia, who states that, in 1910, with 1,085 miles in operation outside the Railway Belt, locomotives set

272 fires, causing a loss of $330,000. During 1913, with a mileage of 2,060 miles, there were 176 fires, with a loss of only $690. Even, conceding that 1910 was a very dry year, this is a remarkable showing, and is eminently creditable to the railways.

Owing to the long continued dry weather, the fire season of 1914 was the worst since 1910. Thus far, no comprehensive data respecting losses are available. Fire-protective organizations of all kinds were severely taxed and, in most cases, they need strengthening. Larger appropriations are needed, especially for the protection of young forest growth. Along hundreds of miles, especially where there are no timber limits, the railway companies have been the most effective and, in many cases, the only agencies for the extinguishing of fires. Some of the worst fires originated at a distance from the track, and their spread has been checked by the railways, though they were in no wise responsible.

Seven members of the Committee have contributed papers (herewith appended) on various subjects.

Mr. W. H. Breithaupt emphasises the value of forest cover in moderating extremes of stream flow. He cites the Grand River Valley in Southwestern Ontario, where deforestation has been followed by excessive freshets and extreme low water. Mr. Breithaupt advocates the construction of reservoirs on the upper waters to ensure a more even flow throughout the year.

Mr. J. B. Challies advocates the establishment of a Central Bureau as a clearing house for all survey and general engineering information gathered by the various departments of the Government. He also urges the adoption of a uniform method of publication of such information, especially hydraulic or hydrographic data, including stream flow.

Mr. C. R. Coutlee recommends the development of "power areas," which include a few large powers and many small ones; the development to be carried out by the Federal or by the Provincial Government interested therein. He also urges keeping swamps undrained, preventing the settlement of unarable lands, cutting fire guards in the forest, reducing the fire loss in our cities and towns, and that we should write good English.

Mr. C. E. W. Dodwell repeats his recommendation of last year that the tax be removed from denatured alcohol. He also advocates the growing of the sugar-beet in Canada to furnish the raw material for our sugar refineries and urges the construction of better highways to furnish cheaper transportation. He urges the development of our peat bogs and the reduction of the waste in our coal mines.

Mr. P. M. Sauder discusses the co-ordination and extension of hydrographic surveys, referred to in detail in the beginning of this report, and which, therefore, need not be further discussed here.

Mr. R. O. Sweezey states that his appeal of last year on behalf of the Ojibwas met with a prompt and sympathetic response from the Dominion Government. He also contributes interesting articles respecting Conservation of the forests and the work of the new Forest Products Laboratories.

Col. Thos. H. Tracey has contributed a brief statement respecting waste in British Columbia saw-mills.

During 1914, the Commission of Conservation continued the investigation of the agricultural conditions in Canada; whether weeds were increasing, or the reverse, to what extent fertilizers were used, whether rotation of crops was followed. Farmers were advised respecting their operations and instructed respecting the use of such means and methods as would increase the profits of the farm while maintaining its fertility.

The 33 Illustration Farms carried on during 1912-14 have demonstrated their value as an instructing agency, and this work will hereafter be conducted by the Department of Agriculture, and on a very much larger scale.

The Commission has undertaken a "Power" survey of Canada to ascertain the amount of power-steam, water-power, electric, gas and oil used in the various cities, towns, etc., in the Dominion. The data thus collected will give markets and costs of different kinds of power used, and, thus, assist in determining whether other kinds of power could be economically replaced by water-power or by power generated by other means.

A report on the "Water-Powers of Manitoba, Saskatchewan and Alberta" is now in the press, and a similar report on the Water-Powers of British Columbia is nearly ready for the printers. Publication has, however, been delayed by the financial situation.

At the 1914 meeting of the Commission of Conservation, special attention was given to the subject of Town Planning and Housing, both important subjects from the standpoint of public health. One of the primary essentials to human efficiency is the supplying of sanitary and healthy homes to the worker in offices, shops and factories. To carry out a propaganda of town-planning and efficient housing conditions, the services of Mr. Thomas Adams, Senior Town-Planning Adviser to the Government of Great Britain were secured. It is hoped that the various provinces will pass town-planning legislation that will furnish the machinery whereby municipalities will be empowered to carry out these very necessary reforms.

The Commission of Conservation has also investigated many other questions, such as the perpetuation of our great fisheries, the economic development of our mines, the elimination of waste in coal mining, the saving of by-products by the adoption of the by-product coke oven, the investigation of fur-farming, the prevention of the pollution of streams and lakes, the provision of preserves for fur-bearing animals, the protection of migratory and other game-birds, the prevention of typhoid epidemics, the elimination of slums, and etc.

TEN MEMBERS OF THE COMMITTEE HAVE CONTRIBUTED SUGGESTIONS AND DISCUSSIONS WHICH ARE PRINTED HEREWITH.

Mr. W. H. Breithaupt reports on the situation in the Grand River valley, as follows:—

"Southwestern Ontario, originally, and largely up to sixty or seventy years ago, heavily timbered, is now excellent farming country, and is, due to its natural advantages, geographical and other, becoming in many respects the principal manufacturing district in Canada. Its magnificent timber growth has been largely wasted, mostly inevitably so, to clear the land for agriculture. Only the larger timbers of pine were used, sizes now valuable were largely wasted; the magnificent maple and other hardwoods had mostly one value only, and that was for firewood. Great quantities of it were used for railway locomotive fuel until about 1875. Much of the original forestation could have been retained, with better economy, and this holds particularly in regard to the extensive swamp areas on the higher, and comparatively flat, large area which forms the head watershed of many of the rivers. There is, to some slight extent, activity in reforestation. This will have to be on larger scale than hitherto to have effect to any appreciable extent.

"Precipitation throughout Southwestern Ontario ranges from about 30 to 40 in. per annum, and has not varied appreciably with deforestation, which has, however, changed the former characteristics of stream flow, moderate floods on snow melting in the spring and well sustained flow throughout the year, to destructive spring floods and flow in the low water months, a small fraction of what it was formerly. Flow control of rivers has become the most important conservation question, particularly in the river valleys.

"Municipalities along the valley of the Grand River have agitated the question of conservation of the river for a number of

years. The Hydro-Electric Power Commission of Ontario has carried on special work on the river for the past two seasons, and while this is not yet completed, the determinations so far made give favorable findings as to practicability and economy of flood control, and flow regulation generally, by the method of storage.

"The Commission began work in the fall of 1912, with a reconnaissance survey, extending from the outlet of Lake Erie to the headwaters of the river, and also up all the main tributaries to their headwaters. This survey disclosed three sites on the main river practicable for reservoirs of considerable capacity, the largest one below Elora, two sites on the Conestogo River of fair capacity, two on the Speed River not large enough to be of material benefit, one on the Nith with fair capacity, and one on Whiteman Creek. Levels were carried the length of the survey, and bench marks established, mostly on bridge piers and abutments as far up as Belwood on the main river, and also on the Speed and on the Nith. Eighteen gauges were set, on the main river and tributaries.

"Discharge observations began with July, 1913, and as the spring flood this year was an exceptionally light one no destructive flood discharge has as yet been gauged by the Commission. Discharges are recorded for five stations on the main river, one on the Nith, two on the Speed, one on the Conestogo, one on Fairchild Creek, one on Boston Creek, and one on Galt Creek at Kerr Street bridge.

"Detail topographical survey of the larger reservoir sites has been the work of this year, and it is here that important favorable conditions have been found. The largest practicable basin is on the main river in Pilkington Township, Wellington County, extending from about the southerly boundary line of the township, the northerly boundary of Waterloo County, into the gorge below Elora.

"The general conformation of the Pilkington site is that of a wide, flat-bottomed bowl contracting downstream, rather abruptly, into an elongated neck, a narrow valley with fairly steep sides, and narrowing upstream to the gorge below Elora. Two dam locations were considered, No. 1 dam, some distance down the valley, No. 2 dam, at the neck contraction. No. 1 dam gives considerably the larger capacity, 2,618,563,000 cubic feet as compared to No. 2, 1,920,422,000 cubic feet. The elevation of the river bed at No. 1 dam is 1,065, and water level elevation for the capacity stated is 1,150 feet. Foundation investigations have not yet been made, but limestone is underlying, so that a satisfactory foundation is likely for whatever final dam location may be made in this vicinity. The area of the surface of the reservoir when filled to 1,150 feet elevation will be almost exactly 2½ square miles; allowing for marginal land,

a total of about 2¾ square miles, 1,760 acres, would be required. A large part of this land is stream bed or subject to overflow, the rest good farm land, including a number of farmsteads, with their buildings. Two roads and a bridge would have to be relocated. The mean depth of the reservoir when full would be 36.9 feet, maximum depth, 85 feet. Assuming the low water level at elevation 1,080, the dischargeable capacity of the reservoir would be 2,592,-282,000 cubic feet, in round numbers, 2,600,000,000.

"As to cost of this reservoir no approximately close estimates can as yet be made. Land and damage should be a comparatively small part. On the whole, however, from determinations so far made, and in view of the great benefit to be derived, it may be accepted that cost will be fairly within economic practicability.

"The drainage area to this reservoir site is approximately 480 square miles. Assuming an annual precipitation of from 35 to 38 inches and a runoff of 1 foot, the annual runoff would suffice to fill the reservoir five times. The 1913 flood flow in Elora, approximately 13,000 c.f.s. would take 55¼ hours to fill the capacity of 2,600,000,000 cubic feet. A considerable stream, the Irvine River, comes in just below Elora. This, with a smaller stream, gives over one-seventh of the drainage area of 480 square miles considered. Assuming the Elora discharge to be correspondingly increased to 15,000 c.f.s., we get exactly two days, 48 hours, of maximum flood flow containable in the reservoir, and this would be the maximum relief afforded for the length of the lower river from this one reservoir.

"It is very desirable to also impound the flood flow coming from the Conestogo. On this tributary no such capacity as that of the Pilkington basin is found practicable, but there is one site, fairly upstream, with drainage area of not over 250 square miles (the drainage area to St. Jacobs is 312 square miles), where it is approximately estimated that a capacity of one billion cubic feet can be obtained. This, together, with the No. 2 Pilkington dam, smaller than No. 1, would give better flood control in the lower river, in that a much larger volume could be held back, even if for a shorter time. In this manner a volume approximately 20,000 c.f.s., the combined flow of both main river and Conestogo tributary could be held back for 24 hours.

"As to maintenance of flow for the low water months, 2.6 billion cubic feet of water would give a continuous flow of 300 cubic feet per second for three months and ten days. In that period rainfall at various times could be expected, making up not alone for evaporation in the reservoir, but also contributing to flow. On the other hand, evaporation appears, as far as observations of stream flow have gone, to have large diminishing effect on runoff, in the Grand

River watershed. At Belwood, drainage, 270 square miles, the mean discharge for the months of August and September, 1913, was only 5 c.f.s.; at Conestogo, drainage area 538 square miles, 24½ c.f.s.; while at Eugenia Falls, on the Beaver River, on the steep slope to Georgian Bay, on the north side of the table-land, the mean discharge for the same time, with only 74 square miles of drainage area, was 30½ c.f.s., a very remarkable difference, due to two main conditions, the much greater declivity of the Beaver drainage area, and the fact that it contains swamps, and is otherwise still largely wooded.

"A feature greatly simplifying the problem on the Grand River is that there is only one large flood in the year, in the spring, on snow melting."

Mr. J. Chalmers contributes the following: —

"In connection with the request for suggestions from members of the Committee on Conservation, the most important matter as I see it at present is the question of reforestation. The district between Winnipeg and North Bay, embracing the Rainy Lake watershed, and the watershed along the north shore of Lake Superior, has at one time been heavily timbered, but owing to devastation by fire, the large timber has been practically all destroyed for years and the country is now growing up with a small mixed growth. This territory, which at one time produced timber of a commercial quality, is quite able to reproduce the same, and the writer can see no better asset for this territory than careful reforestation, as a large majority of the territory is useless for other purposes. Of course it would be a question of years before this timber would be of commercial value, but in the life of a nation the time would be infinitesimal.

"The same argument applies to the country along the west slope and foothills of the Rocky Mountains, where with proper reforestation and care, the forests in time would be replaced in their primeval condition.

"A further benefit to be derived by reforestation is the conservation of moisture and rainfall on the watersheds of the main streams running through the country, giving a more even distribution of the annual precipitation.

"It is realized that this is a very large question, but taken up in a systematic manner and added to from year to year, it is only a matter of time before all this territory, otherwise unproductive, could be made self-supporting, and later a constant source of revenue to the Dominion."

Mr. C. R. Coutlee suggested the following as matters for discussion :—

Combining Hydro-Electric Powers :—There are several power areas which include a few large powers and many small ones. It would be a saving if these powers could be developed by the provincial or the federal government, and hooked up under one management. Large bulks of power could then be offered for manufacturing purposes at suitable points. Many advantages are conferred by having the factory site chosen at a convenient place with the assurance that energy can be brought to it.

Keeping Swamp Areas :—Swamps are valuable reservoirs, and should be withdrawn from cultivation and drainage. Their outlets should be governed by regulation works through which the stored water could be fed out during dry periods.

Unarable Lands :—Care should be exercised to prevent farmers settling on unsuitable lands. Wholesale mistakes of this kind are now being recognized, where after years of hard work the people have degenerated and live in abject poverty. Generally the acid granite soils are not suitable for farming, but grow crops of certain trees and shrubs. Where errors of selection become manifest, the whole population should be bought out and removed.

Cutting Fire Guards :—The forest fire trouble seems due to the immense areas of continuous forests. At times fertile valleys intersect the forest areas, and it is suggested that these should be denuded and open to settlement, with the idea of checking fires. From these areas secondary lanes might be cut, dividing the forest into blocks of convenient size.

Fire Loss :—Possibly the burning of a city block is of more importance than the loss of whole townships of forests. The too free use of soft timber in floors, walls and roofs of dwelling houses is largely responsible for the enormous fire losses in America.

Mr. C. E. W. Dodwell writes as follows :—

"The added responsibilities and the widened field of labor that at the present juncture the Commission of Conservation will doubtless feel to be theirs, will be largely compensated by the magnificent opportunities for signal national service that they will enjoy, as the Intelligence Department of the Commercial and Industrial campaign, the sequel and corollary of the present appalling military conflict.

Alcohol.

"Last year I pointed out that, in the United States, the public could buy pyro, or denatured alcohol, for 50 cents per gallon, and that it was a tremendous boon for a host of industrial and domestic purposes.

"The law removing the prohibitory tax of $2.08 per gallon from denatured alcohol, was enacted by the United States Congress, June 7th, 1906. A supplementary law, passed in 1907, liberalized the terms of the first, and made possible a system of distribution, under which it may be obtained at reasonable prices.

"As an illuminant the relative economy and efficiency of pyro has been demonstrated by the Electric Testing Laboratories of New York, which give the following summary report:—

Description	One gallon will last	Average candle power	Candle power hours.
Alcohol burner	38 hrs. 30 min	5.2	1740
Kerosene lamp	32 hrs. 42 min.	14.8	484

"Therefore, with pyro at 50 cents per gallon, it would be as cheap as kerosene at 15 cents per gallon, and a 45 c.p. pyro lamp would cost less than one and a third cents per hour.

"As a source of light, electricity is cheaper than alcohol, acetylene, gas, or oil, a 45 c.p. electric lamp, costing less than 1 cent per hour. But, in villages and country districts, where electricity is not available, the alcohol lamp is *facile princeps*, on account of cheapness, health, convenience and low cost.

"When used as fuel for cooking purposes, pyro is cheaper, cleaner, and far more convenient than coal, wood or oil. There are in general use in the United States many forms of stoves, for kitchen and table use, boilers, bakers, broilers, toasters, etc. Experiments at the Housekeeping Experimental Station at Darien, Conn., go to show that one gallon of alcohol is sufficient to do all the cooking for a family of four persons for seven days.

"For heating purposes, on a small scale, there are portable steam radiators of about 20 square feet heating surface, that will heat a 12′ x 14′ room to a comfortable temperature, without the offensive odor and the vitiation of air, inseparable from the usual portable oil heater.

"As a source of power it seems not improbable that alcohol will, in the not very remote future, supersede gasoline or petrol, at

least partially. Gasoline, being a distillate from petroleum, has a certain fixed and definite limit to quantity, and, though its exhaustion may be remote, in time, the fact has a continued and marked tendency to increase its price ultimately to its limit of economical use as a source of power. The relationship between its supply and demand, therefore, is not a constant. In the last dozen years its price has risen from about 18 cents to about 30 cents per gallon.

"Early this year the Imperial Motor Transport Council of London, appointed a Committee for the purpose of considering the high price of petrol.

"The case presented to this Committee was as follows:—

"With the increasing use of motor vehicles the demand for fuel goes up, but the supply diminishes. Another fuel must be found, and alcohol, which can be produced at about half the present price of petrol, is held to be the most promising substitute. When mixed with a small proportion of benzol it is as effective as petrol—given the right engine.

"It was the purpose of the Committee to ask the Government to modify their conditions respecting alcohol, when used for power purposes. The question of an efficient alcohol engine would form the subject of experiments to be carried out under the control, and at the expense of, the Committee.

"With alcohol there is no limit of potential supply, for practically every vegetable substance in nature that is capable of fermentation is capable of yielding alcohol, and therefore, as to this article the relationship between supply and demand is a constant.

"Among the more direct, convenient and plentiful sources of alcohol may be mentioned grain, molasses, potatoes, beets, sawdust, wood pulp and peat. As to the three last of these substances, their economic possibilities will, no doubt, be investigated by the Forest Products Laboratories. A year or so ago a newspaper item stated that a large English company had commenced the production of acetone and fusel oil from saw-dust, by a simple process of fermentation. These are valuable substances, and if alcohol can also be produced, the thousands of tons of saw-dust now lying waste all over the country will have considerable and hitherto unsuspected value.

"In Canada, molasses as a source of alcohol is unimportant. Most of the alcohol used in the United States and Canada is distilled from grain, and that it can be done economically and on a commercial basis is evidenced by the fact that within the last few years several large American distilleries that formerly turned out whisky, have taken up the production of pyro. That in so doing

they were actuated rather by business principles than by temperance motives is a reasonable inference.

"I am not aware that any considerable quantity of alcohol has been produced in Canada from potatoes, but in Europe, notably in Germany, it is an extensive and presumably profitable industry.

"If the production of alcohol from potatoes, and their growth for this purpose, are remunerative industries in Germany, it is difficult to see why they could not be profitably introduced in Canada, where the condition of soil and climate are eminently suitable.

"In every province of Canada there are many factories for the production of jams, and preserved fruits and vegetables. In most cases the refuse, comprising many tons of pulp, skins, peelings, cores, seeds, etc., could be more profitably used as a source of alcohol than as fuel, manure or swine feed. A couple of years ago the papers reported that in the west many thousands of bushels of wheat were spoiling (incipient fermentation) in store-houses and elevators, for lack of, or delay in, transportation facilities. Little of the value of this grain need have been lost if it could have been hurried to the nearest distillery for the production of pyro. In December, 1913, it was stated by a Member of Parliament that about a million barrels of potatoes, valued at $1,250,000, were going to waste in New Brunswick on account of the United States markets being barred to Canadian potatoes. If they could have been made immediately available as a source of alcohol there need have been no waste.

"I deem it unnecessary to further elaborate this subject or to go into the details of the alcohol values of the several substances mentioned, even were such figures accessible. The chief object of this note is to point out to the Committee the importance and great desirability of prevailing upon the Government to make such changes in existing tariff and excise as will permit the public to obtain cheap alcohol for industrial and domestic use, as in the United States and other countries.

"I am in pursuit of information as to the effect of the reduction of duty and excise on denatured alcohol on the revenue of the United States, and also as to the possible encouragement to illicit distilling that might be feared by our Government as a result, and at a future time I shall submit a supplementary note.

Beet Sugar.

"Attention is called to the importance of this subject in an article in the '19th Century Review' for October, 1914, by J. W. Robertson-Scott, 'Opportunities of the War, An Urgent Plea for State Sugar Factories,' from which most of my figures are taken.

"The total consumption of sugar in the United Kingdom in 1913 was, in round figures, 2,000,000 tons, or nearly 100 pounds per head of population. Of this total, 80%, or nearly 1,600,000 tons was beet sugar, of which 1,300,000 tons came from Germany and Austria.

"In Great Britain, in 1910, the cultivation of sugar beet was seriously undertaken, and a factory was established at Cantley, in Norfolk. Experiments in the growth of beets gave as a result 25½ tons or roots per acre and 15½ per cent. of pure sugar in the juice. In Canada, as the result of experiments, carried on at a number of our Experimental Farms, to which further reference will be made, the yield per acre of roots is somewhat less and the percentage of sugar in the juice somewhat greater. In *France* the sugar yield of the roots is 11.6%, and in *Germany* 12.8% of the weight of the roots. One ton of beets has approximately the same sugar value as a ton of sugar cane. In *Germany* and *Austria* the net yield of sugar per acre of beets is 3,600 pounds, and the average cost of production $2.00 per hundred pounds. In *Canada* the wholesale price of refined sugar just before the war was $5.10 per hundred pounds. It is now about $7.00, with a probability of a slight further rise before the end of the war, and little likelihood of the return to the ante-war figure for several years.

"In the November issue, 1914, of the '19th Century Review,' Mr. Robinson-Scott has another article on the subject, 'Shall We Be Punished For Making Sugar," and in this he has the following *Estimated Costs and Returns per Acre of Sugar Beets.*

	£	s.	d.
13 tons washed, topped and delivered at £1	13	0	0
Leaves and tops	0	15	0
Value of portion of beet pulp returned free, say 15s.	0	15	0
Free seed, say 20 lb. at say	0	7	0
Value of portion of lime returned free	0	3	0
	15	0	0
Total cost of producing crop and delivering to factory. (This could often be less)	12	0	0
Net cash profit as soon as roots have been delivered, say in October or November	£3	0	0

"These figures, which are the farmer's aspect of the question, were published some years ago, and can be improved upon to-day. £3, or $15 per acre net profit is not, of course, as much as may be obtained from certain forms of fruit raising, or intensive culture in

high-class vegetables, etc., but for large scale farming, at least on such land and in such localities as are not adapted for either fruit raising or other intensive culture, it is a fair return on agricultural investment.

"In the Report for the year ending March 31st, 1913, of the operations of ten experimental farms throughout the country, (Appendix to the Report of the Minister of Agriculture) detailed results are given of the experiments carried on during the past thirteen years, to determine the suitability of the soil and climate of the country for raising sugar beets. Tables are given, showing the yield per acre, the percentage of juice in the roots, and of sugar in the juice. The report says.—

> " 'A survey of the whole series shows remarkably satisfactory results.....It has been conclusively shown from this investigation, which has been carried on systematically since 1901, that beets, suitable for factory purposes. can be grown at widely distant points in the Dominion.'

"The writer of the articles cited above further says, (19th Century Review, October, 1914, page 881) :—

> " 'The war, during which so large a proportion of our sugar must be cut off, will not be a short one, and when it is over it must leave the beet sugar industry of Germany Austria and other parts of Europe in a crippled condition. There is, therefore, an extraordinarily favorable chance of establishing in this country the production of a necessary article of food, for which we ought never to have relied too largely on the foreigner.'

"There are several ways in which the Federal Government could legitimately establish the beet sugar industry, (a) By building and operating factories as Government institutions, an unprecedented procedure, but in the circumstances not out of the question, (b) By lending the necessary funds, at low rate of interest, and under suitable conditions and restrictions, to companies able and willing to take up the business on a large scale, and (c) By increased duties on imported sugar, with or without bounties on Canadian-made beet sugar.

"As to the quantity of beet sugar actually produced in Canada, no detailed figures appear to be available, but there is one factory in Wallaceburg, Ont., and another in Raymond, Alberta, and between them I believe they turn out from 5,000 to 10,000 tons annually. That the industry is still more or less alive may be inferred from the fact that in the fiscal year ending March 31st, 1914, nearly

$61,000 worth of machinery, for the manufacture of beet sugar, was imported into Canada.

"There is one obstacle that I foresee in the way of the development of the industry in Canada, and that is the high cost of labor. This difficulty is common to several prospective developments of our resources, and there is no doubt but that it is a serious one. Other difficulties that occur to me are the prodigality of nature and the sparseness of the population of the Dominion (about 2½ people per square mile, as against 372 in the United Kingdom, 330 in Germany, 191 in France, and over 600 in Belgium). But if these circumstances are discouragements they are also incentives to continued activities and exhaustive research in the exploitation of the natural resources and industrial capabilities of our great country.*

HIGHWAYS.

"If agriculture is the backbone of a country, transportation routes, whether wet or dry, may aptly be called its arteries. It should not require a high order of intelligence to understand that good roads are of immense importance to all the inhabitants of a country, but especially to the farmer. It should not require a mathematician to appreciate the fact that the value of a barrel of apples or a bushel of potatoes varies inversely as the cost of carrying it to market.

"I have little knowledge of the conditions of public highways in either parts of the Dominion, but in Nova Scotia, in the past half-century there has been money enough wasted on the public roads to build excellent macadamized highways nearly all over the Province, and at this date, with few exceptions, they are little short of a disgrace to a supposedly civilized country. The reasons for this deplorable state of things are: that the money grants are expended under such circumstances, and under supervision of such a character, that the only perceptible result is that a bad road is made worse. The favorite method of repairing or remaking a road seems to be to plough the side ditches, and then throw the re-

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*London Daily Mail, November 21st, 1914.

'That the war will settle the English beet sugar question one way or the other authoritative opinion does not doubt, and this is the time when any efforts which the State is going to make to put the industry on a firm footing must be decided.

It should be a helpful fact to those who are considering the problem that in this critical year the only beet sugar factory so far built in this country is going to make a profit for the first time.'

This is the factory at Cantley in Norfolk, mentioned above. The Manager explained that the chief reason why no profit had hitherto been shown was that the farmers had not supported the factory as they should have done, but that there was no doubt that, if the industry were backed up by the Government in such a way that the farmers would have confidence in its permanence and stability, an ample quantity of beets would be forthcoming.

sulting sods and mud into a bank or windrow along the middle of the road. It has long been my firm conviction that greater and more direct advantage would accrue to the people at large from the expenditure of $1,000,000 on the public roads, under honest and expert engineering supervision, than from the expenditure of $4,000,000 in railways. There are few subjects of more direct importance, from the point of view of the development of the natural resources of the country, than that of good roads, and it is one in furtherance of which the Commission of Conservation, aided by the Canadian Society of Civil Engineers might very appropriately do a little missionary work, in enlightening the community on its great importance, and inducing the Governments, Federal and Provincial, to take up this important matter. As a practical policy of far-sighted national wisdom, few courses of action would appeal with greater force to the more intelligent section of the electorate.

PEAT.

"Canada contains 30,000,000 acres of peat bogs, constituting immense potential wealth which, up to the present, has not, thus far been developed. Spasmodic efforts have been made to establish factories for the preparation of commercial peat fuel, but for various reasons—insufficient capital, high cost of labor, low cost of coal and others—the industry can not be said to have passed the preliminary stages nor to have gained a footing on a commercial basis.

"A dozen years ago a company was formed, and a plant was set up at Tusket, near Yarmouth, N.S., something over $20,000 being spent on the installation. A few tons of excellent, partly carbonized, compressed peat fuel were turned out, but for reasons, that, though a small shareholder in the enterprise, I never discovered, it languished and finally died. A few bags of the output sent to me were used by Admiral Sir A. L. Douglas in his steam barge. He told me that it was admirable steam fuel, but that his engineer did not like it because it needed such a lot of shoveling into the fire box. I tried it in a grate at my house, and there it was simply an ideal fuel, giving a cheerful, hot, smokeless fire, with almost no ash. The manager of the concern claimed that the finished product could be turned out for about, or less than, $2.50 per ton, and if this figure was correct, it makes the failure the more unaccountable.

"The Department of Mines, at its Fuel Testing Station at Ottawa, has, in the past few years, done much valuable experimental work, and issued numerous interesting bulletins, descriptive of exhaustive trials of peat as a fuel, but, in spite of the very favor-

able character of the results and reports of these trials, the manufacture seems to hang-fire as a commercial industry in Canada. Much more has been done in this line in the United States.

"Bulletin No. 154 of the Department of Mines 'Report on the Utilization of Peat Fuel for the Production of Power,' by B. F. Haanel, is an elaborate compilation, embodying the results of experiments conducted at the fuel-testing station. In the 'General Deductions and Conclusions,' the comparative power values of peat and coal are not specially emphasized but figures are given from which it would appear that, pound for pound, coal is slightly superior as a source of *producer-gas power*, though a little more expensive.

Calorific value of coal	12,500 B.T.U. per lb.
" " " dry peat	8,650 " " "
Fuel economy of producer-gas power plant	1.25-1.50 lbs. of coal per b.h.p.
Fuel economy of producer-gas power plant	1.78-2.04 lbs. of peat per b.h.p.
Fuel cost of peat in producer-gas power plant, with peat at $2 per ton	$8.70 per b.h.p.

"Hence, the superiority of peat over coal as a source of power in a producer-gas plant would depend upon its lower cost, which is the point at issue, and not the relative advantages of the ordinary steam plant and the producer-gas plant, as developers of power, the latter, as is well known, being a good deal superior to the former.

"The salient fact to which I wish to call attention is, that excellent peat fuel can be put on the market for $2.00 to $2.50 per ton, and that good business could be done by a company with sufficient courage and capital to take up the industry on an adequate scale.

"The chief obstacles in the way of the establishment of the industry appear to be, (a) the difficulty of adequately drying the peat before carbonization and compression. It has been almost conclusively shown that artificial drying is too expensive; and natural or air drying for a plant of any considerable size, requires an immense area of drying space and longer periods of warm, dry weather than are experienced in most parts of Canada. (b) Even with a factory on a large scale, the machinery would have to be more or less portable, because the peat bogs throughout the country are widely scattered and none of them are inexhaustible, or even approach our working coal fields, in available quantity. In addition, it must be considered that air-dried peat contains about 35 per

cent. of moisture, and in shipment freight rate is paid on this amount of water.

"But peat has other features of potential value. Experiments have shown that it will yield from 25 to 30 gallons of alcohol, and from 20 to 40 pounds of ammonia-sulphate per ton (present value of the latter $78.00 per ton). Indeed, 40 gallons and 66 pounds, respectively, have been claimed as actual results. I have no information regarding the cost per gallon of distillation on which the possible utility of the substance naturally depends, and this is a matter in regard to which the Forest Products Laboratories might profitably do some very interesting and valuable experimenting.

"In Michigan, in 1900, a factory was opened for the manufacture of paper from peat. Whether it was a success or a failure, I do not know, but in view of the rapid depletion of our forests, now going on, immense public benefit will result from a demonstration that peat is capable of replacing pulp wood as a source of paper.

Prevention of Coal Waste.

"At our coal mines, from the Atlantic to the Pacific, the waste of coal, and so of potential power, is simply appalling, or would be so in a country less generously endowed by nature. Mr. W. J. Dick, Mining Engineer to the Commission of Conservation, states that, in Saskatchewan, Alberta and British Columbia, from 10% to 35% of the whole output of coal brought to the surface is waste slack. Some of it is burnt on the prairies, owing to the danger of spontaneous combustion, if it is left lying about the pit-head. In British Columbia much is thrown into the sea. There is no doubt but that the waste in Eastern Canada is correspondingly great, and some attempt to inculcate a little economy on the part of coal mine operators would be in the direct line of the efforts and functions of the Commission.

"Mr. Dick says, in his report to the Commission on 'Conservation of Coal in Canada,' 1914,—

> " 'To encourage the utilization of low-grade coals, and in order also to prevent the waste of slack coal, investigations should be carried on by the Government to determine the suitability of these classes of coal for use in the gas-producer for generating power, and their adaptability for the manufacture of briquettes for domestic use.'

"There are several briquetting plants in Canada; at the Bankhead Mine in British Columbia, where the capacity is 500 tons per 24 hours, and the cost of production is $3.10 per ton; at the Inverness Mine, C.B., capacity, 240 tons per day; at the McKay Mine,

C.B., with an equal capacity; and at the Colonial Mine, near Sydney Mines, C.B., with a capacity of 175 tons per day. The limiting output of these four plants therefore is only about 1,100 tons per day, say 350,000 tons per annum, which is a very small proportion of the total slack coal produced, the rest being for the most part sheer waste.

"In Germany the manufacture of briquettes is an industry on a different scale, amounting to over 20,000,000 tons per annum. Of this large output, however, some 77% is made from lignite, but, as there are immense deposits of lignite in Canada, the value of Germany's example is but enhanced.

"At most of our mines a more profitable mode of realizing the value of slack and lignites would probably be the development of power by producer-gas, for the generation and transmission of electricity. The economic advantages of a producer-gas power plant over the ordinary steam plant to-day needs no demonstration, and even at the pit-head, where coal is at its minimum cost, these advantages should be considered by our mine operators.

Coal Tar Derivatives.

"It is a well-known fact that the ultimate derivatives from the destructive distillation of a ton of bituminous coal are worth many times the original ton of coal, but that it costs money and skill of a highly technical character to produce them. In recent years, Germany has led the world in industrial chemistry, not because she has had a monopoly, either in capital or scientific knowledge, but simply that she seized opportunities that were neglected by other countries, notably by England. To-day she enjoys practically a monopoly in synthetic dyes and many other chemical substances derived from coal.

"The partial paralysis of Germany's industrial activities, as the direct result of the war, places within the grasp of England, and the Empire at large, a unique opportunity—I might say the national duty—of capturing from our enemy much actual and potential wealth in trade, commerce and manufactures, and, in this national-duty campaign, Canada should actively participate.

"Mr. W. J. Dick, in his report to the Conservation Commission on 'Conservation of Coal in Canada, 1914,' says,—

> " 'Canada and the United States are far behind Germany and other foreign countries in adopting the economies resulting from the coking of coal in *by-product* ovens. In

> Germany, at the present time, little or no coke is made except in retort (by-product) ovens. When the economies which may be effected by the use of such ovens have been so clearly demonstrated, not only by plants which have been constructed in Europe, but also by plants in the United States and at Sydney and Sault Ste. Marie, in Canada, it seems difficult to understand why they are not more generally adopted in Western Canada. There are several reasons why they have not been introduced; first, the greater cost incurred in installing them, and second, the lack of markets for the resultant by-products.'

"Some of our collieries are equipped with coke ovens which produce coke for iron and steel making, but of these coking plants only some two or three are by-product ovens. At the others, where the ovens are of a bee-hive type, the products are almost wholly wasted. A by-product oven costs about $10,000, a bee-hive oven about $1,000, but it has been shown that the advantage of the by-product oven over the bee-hive is so marked that the saving in coal and by-products by its use amounts to about $4,500 per annum, or for by-products alone about $3,700 on the normal output of 6.3 tons per oven per day.

"In Cape Breton the collieries of the Dominion Coal Company have a total output of about 5,000,000 tons per annum. In connection therewith, the Dominion Iron and Steel Company have, at Sydney, a coking plant turning out nearly half a million tons of coke per annum, nearly all of which they use in iron and steel making. The resulting tar they sell at two or three cents per gallon to the Dominion Tar & Chemical Company, at whose neighboring works it is distilled for its primary products of light oils, creosote, carbolic acid and pitch.

"So far as I am aware, no attempt is made by this last-named company, nor by any other in Canada, to extract any of the more complex and valuable derivatives from tar distillation, and herein lie the roots of a potential industry of considerable value and importance. As against the practicability of its establishment in Canada, it cannot be urged, as it undoubtedly can be urged in the case of several other industries suggested in these notes, that it is hampered by the high cost of labor, for comparatively little manual labor would be employed. The necessary highly skilled labor of practical chemists would cost little more here than in other countries.

"In no part of the field of industrial chemistry, to which at this juncture we should lay siege, is the promise of reward greater than

in the direction of coal tar distillation. Following the primary derivatives therefrom, the benzene, naphthalene, anthracene and phenanthrene series, are a host of derivatives (Lunge, in 'Coal Tar and Ammonia' gives a list of 190 substances) some of them, of course, mere chemical curiosities, rare and unimportant, but many of great and increasing scientific and pharmaceutical value.

"As I shall not be able to attend the Annual Meeting of the Society, I suggest that, if the Conservation Committee is to be continued, its aims and endeavors be reduced to some sort of method and, to that end, each member be asked to submit a note or memorandum on some specific subject, to be allotted or selected, with special view to the locality, circumstances and special features of his own individual activities and duties."

Mr. James B. Hegan writes as follows:—

"I propose to confine my suggestions entirely to matters pertaining to Prince Edward Island and find the field rather limited. inasmuch as about all, if not all, of the land, both tillable and forest, is now privately owned, and, while there are considerable tracts of growing timber forest, very little, if any, practical attention has been given by its owners, or by the Provincial Government, to guarding against forest fires, or for its reforesting. To continue and ensure this needed and important supply for the future, both these matters are worthy of attention, and should be taken up and arranged for by the requisite information, assistance, etc., being furnished by the Dominion or Provincial Government.

"Benefit would possibly result to the fishing industry, one of the Province's most valuable assets, were changes made in the present system of wardenship, and in the carrying out and enforcing of the existing laws and regulations regarding pollution of the streams and rivers by deposits of sawdust, etc., the illegal taking of fish, in and out of season, and the provision of proper and efficient fishways. Efficient enforcement would require the appointment of a few permanent, reliable officers, who should be paid sufficient salaries to ensure the devotion of their whole time and attention to their duties. The latter might include, during the lobster fishing season, the collection of the spawn lobsters caught by the fishermen. The fishermen should be compensated at same rates as if delivered at a canning factory. The lobsters so had should be set free in the inland and protected bays, where the catching of lobsters should be prohibited. It is suggested that the using of such means for their propagation, in lieu of the existing lobster hatcheries, is worthy of consideration, and should be given a trial. Whether it is advisable to permit the use of

steam trawlers within the enclosed bays and the 'three-mile limit' might be also a matter for consideration for both the interests of this Province and the Maritime Provinces generally."

Major R. W. Leonard suggested the "Economic Aspect of the proposed Georgian Bay Canal and the enlargement of the Welland-St. Lawrence Ship Canals, compared with Rail Transportation from Georgian Bay to Montreal," as an appropriate subject for discussion, and was requested to contribute a memorandum on this very important subject.

Major Leonard also wrote that:—

"Mr. J. B. Challies' recommendation that a Central Bureau, or Ottawa Clearing House of general Engineering information be established, appeals to me as being eminently sensible, and if adopted, *might* result in very large economies in the way of making surveys of the same ground by different Departments, etc. In my opinion, however, these suggestions do not go far enough, as in the various departments in Ottawa there are employed many men of high technical attainments in various lines, whose abilities are neither known nor recognized outside their own departments.

"The services of these employees could in very many cases be very usefully employed by other Departments of the Government than the one in which they are retained, without increased remuneration, and with much credit to the individuals, who would be glad to be given the opportunity of demonstrating their usefulness, and thus obtaining recognition and promotion.

"This Central Bureau or Clearing House might consist of a Committee of one or two able men, with necessary clerks, and with authority to collect and give information regarding the technical qualifications of employees by the Government and the work which they are doing, in addition to the tabulation of the maps and the other information filed in the various departments.

"Such a Bureau, *if made use of*, might, I believe, result in a great saving of employment of outside technical men, *if such a saving were considered desirable* by the members of the Government."

Mr. P. M. Sauder writes:—

"I have nothing new to bring before the Committee, but would like to again refer to the matter that I brought up two years ago, namely, that the Society urge the Dominion Government to co-ordinate and extend its Hydrographic Surveys.

"I was glad to note that when the Committee took this matter up it was found that the Dominion Government is giving more

attention to this matter than is generally realized. It was also pointed out that there was need for a complete re-organization in regard to it, and that this work should be concentrated in some shape or form, and that preferably some Dominion organizations should undertake it.

"Our report was adopted at the Annual Meeting in January, 1913, and the following motion passed:—

> " 'Whereas this Society is of the opinion that it would be to the general advantage of Canada if a comprehensive system of hydrographic surveys was organized and prosecuted by some central body, with a special reference to stream measurements. Be it resolved that the council of this Society be directed to initiate with the proper officers of the Dominion Government and the various provincial governments a proposal looking to the co-ordination of all stream measurement investigations which are now being carried on by the several Dominion and Provincial Government Departments in various regions of the country, with the ultimate object of consolidating and continuing such investigations under some central body.'

"At a later date, I noticed a report to the effect that the Commission of Conservation would compile a record of all the stream flow data available in Canada. As yet I have not heard of any such report being published, nor have I heard any further regarding the matter.

"This probably is not a good time to approach the Government with matters of this nature, but Council should give this matter serious attention and take it up energetically with the proper officials of the Dominion and Provincial Governments at the first opportunity.

"In this connection, I would like to point out that apparently there is much more hydrographic work being done in the irrigation districts of Western Canada than elsewhere in Canada, and this, I think, is largely due to the activities of the Western Canada Irrigation Association. This was one of the first matters considered by this Association and taken up by it with the Federal and Provincial Governments, with the result that hydrographic work has been given special attention in this area.

"I am glad to note that special surveys and investigations have recently been made on the Grand River in southwestern Ontario. Having lived on the banks of this stream for several years, I quite appreciate the importance of this work, but this is not the only stream requiring attention. It seems to me that stream-flow records should have been commenced on all rivers years ago, but, as they

have not, steps should be taken to start them at once on all the important streams where they are not already being taken.

"Possibly a co-ordination of all of the work cannot be effected at once, but the work might at least be extended and this Society is the proper body to bring such matters to the attention of the Governments.

"The average person does not realize the importance and value of stream-flow records and there are, therefore, very few to keep the Government's attention to these matters. True, a number of the officials fully appreciate their value and take every opportunity to emphasize their importance, but there is no better way of getting a Government to take action than to be approached by a representative body, such as the Canadian Society of Civil Engineers.

"Mr. J. B. Challies made a recommendation last year which appears to have escaped any attention, and yet it seems to me it is a matter that should concern members of this Society, particularly. I refer to his recommendation that an office should be created for the distribution of public documents issued by the different Departments of the Dominion Government, and of the several Provincial Governments. I hope that some Committee will be instructed to take this matter up with the proper officials of the Federal Government and strongly urge them to establish such an office and at the same time to ask the Government to compile as much of its data in convenient form for publication as possible. There are many highly qualified technical men in the employ of the Government, and many of these could prepare very valuable bulletins on special investigations, which would be very valuable to the public, and particularly, Civil Engineers."

Mr. Sauder also wrote:—"I enclose herewith the bulletin of the 21st. International Irrigation Congress, at Calgary, in October last, and would particularly direct attention to the following resolution: 'We urge upon the federal governments the necessity for more liberal appropriations for the work of topographic survey in hydrographic stream gauging work; and we urge stronger co-operation by the several states and provinces in making appropriations for this important work.'

"Even though the United States Geological Survey has collected and is collecting a lot of stream flow records, and the Irrigation and Water Powers Branches of the Department of the Interior of Canada are also doing a lot of work in the irrigation districts of Western Canada, the International Irrigation Congress does not propose to let the different Governments forget the importance of this work. It is the Engineering Branch of irrigation

work that particularly requires this data, and I therefore cannot help but think that the Canadian Society of Civil Engineers should also take some action in the matter."

Mr. J. B. Challies, Superintendent, Water Powers Branch, Department of Interior, has sent the following:—

"With respect to the question of the deliberations of the Conservation Committee of the Canadian Society of Civil Engineers for which you ask me to submit suggestions, in my humble opinion this Committee would accomplish more if it confined its attention to matters of immediate professional importance and reasonably possible of solution, through or largely by the action of the members of the Canadian Society of Civil Engineers.

"Abstract questions, such as Indian Welfare, Lobster Conservation, Improved English, etc., are admittedly sufficiently important to occupy the thought and attention of any one interested in Canadian welfare, but surely the urgent necessity of having some central governmental information bureau as a clearing house for all survey and general engineering information gathered by the various Departments of the Government, and the advisability of having some uniform method of publication of such information, especially hydraulic or hydrographic data, including stream flow, offers some tangible possibility of realization, and because of pressing and immediate value, deserves the serious and active attention of our Conservation Committee.

"If it is the question of a general information bureau for the purpose of securing, collating and making available the tremendous amount of extremely valuable engineering data gathered by the various Government Departments at Ottawa, and of the advisability of having our hydraulic and hydrographic data made available by the different Dominion and Provincial organizations in a systematic and regular manner, I can only reiterate the opinions offered in my letter to you of December 31st, 1913,* in this same connection.

"May I suggest that a special effort be made to have as many members as possible of the Conservation Committee meet at the forthcoming Annual Convention of the Society, for the purpose of having a thorough discussion of the various matters that have been brought to the attention of the Committee by its membership?"

Prof. R. O. Sweezey sent the following communication:—

"This year I shall deal very briefly with one or two phases of conservation under the headings of "Indians and Forestry."

* Published in Report of the Committee for 1913. In it Mr. Challies urged the establishment of a Central Bureau to which enquiries respecting results of surveys, investigations, etc., by the Dominion Government could be addressed. He also advocated the segregation of the basin of the Lake of the Woods in Canada as a forest reserve and suggested the advisability of recommending some systematic method of making results of the various hydrographic surveys available to the public quickly and uniformly.

But before taking up these questions permit me to comment on some of last year's suggestions by other members of the Committee.

"Mr. J. B. Challies' recommendation for the establishment of a central information bureau at Ottawa, where the ordinary individual, not versed in the intricacies of tangled red tape, can obtain maps, reports and public documents, is an exceedingly good one, which, were it adopted, would supply a long-felt want, enabling a busy man to obtain the data desired and return to his business unruffled by the exasperating delays which the present jumbled system forces upon him.

"Mr. C. E. Dodwell's contribution of last year on Forestry and the Utilization of Forest Products touches on a very important question, and is especially interesting since he independently reached conclusions on a subject that was then engaging the attention of the Forestry Branch of the Department of the Interior. It will be of interest, therefore, to Mr. Dodwell and other engineers to know something of the progress made in the establishment of the Forest Products Laboratories at McGill University by the Dominion Government.

"This country is rapidly forging ahead to the position of the greatest paper manufacturing country in the world, so that in that alone the efforts are amply justified. These laboratories are under the control of the Director of Forestry, Mr. R. H. Campbell, and Mr. John S. Bates is the Superintendent directly in charge. In order to keep in close touch with the commercial and industrial requirements, an advisory Board of three outside men has been appointed and consists of Mr. Carl Riordon, Mr. J. A. De Cew and Mr. R. O. Sweezey.

"I am indebted to Mr. Bates for a brief summary of the progress made and objects aimed at. This summary is attached to my communication.

"Returning now to the subjects already referred to:—

"(1) *Indians.*—I have pleasure in stating that my appeal of last year on behalf of the Ojibway Indians of Quebec and Ontario met with prompt and sympathetic response from the Federal Government. During the past summer, I have found conditions greatly improved by reason of the presence of medical men employed by the government to succor the afflicted and institute other measures of relief. It is expected that a larger and improved system will evolve from the beginning already made.

"(2) *Forests.*—Some five or six years ago the Conservation cry was first heard in Canada, particular stress being laid on the

perilous conditions threatening the extinction of our forests. That cry has been so persistently maintained by the Canadian Forestry Association and the Press that the effect is now showing in a very gratifying manner.

"Before all this alluring talk of Conservation was heard the forest trails and routes presented deplorable signs of thoughtless negligence in the numerous unextinguished camp fires usually found in the wake of "tenderfoot" and "bushwhacker" alike. That the well organized campaign to educate the erring public in this regard has been successful is well shown now by the fact that to-day it is only on very rare occasions that a smouldering and abandoned camp fire is found, because all woodsmen and sportsmen have been made to think by the teachings of Conservationists, so that they exhibit care when handling fire. But it requires constant effort and repeated warnings to maintain that attitude, else relaxation will permit a return to carelessness and destruction.

"Having expressed appreciation of the progress made, let us now face the evils that remain, which are:—

1. The railway contractor.
2. The railway operator.
3. The settler.

"Railway builders (contractors and others) with characteristic arrogance are perhaps the most provoking of all the destructive agents that hound the forest. Wherever the railway contractor has been millions of acres of virgin forest have been swept by fire, and his ignorant unconcern is only equalled by his carelessness in starting the fire. All that he is concerned about is "cut" and "fill."

"The thousands of foreigners employed on all railway construction, particularly in the timbered hinterland, know the dangers of forest fires, and in their native land would exercise the greatest care. Transported to Canada, they appear to be under the impression, either that there are no laws protecting the forest, or that they are a dead letter. We spend our money and energy educating native Canadians against this evil, but till recently have dumped foreign legions into the forest without controlling their destructive habits of scattering camp fires and smudges everywhere, leaving them to transform the country into miles of desolation.

"The railway operator has, of late years, been compelled to provide mechanical means to protect forests against sparks of locomotives, and the burning of debris along the right-of-way is now largely carried on during the wet periods, though, in remote parts where public opinion is not likely to be aroused, it

is difficult to rigidly supervise the ignorant section-men, who are necessarily entrusted with this work.

"The settler must be educated and compelled to stop burning the forest. There are laws governing his mode of burning slash, but it is difficult to enforce them unless the Governments interested are prepared to pay the cost of efficient protection.

"The conquest of these three destructive enemies of the forest offers no great difficulty if proper measures are taken. And there is enough machinery already, so that we can reasonably expect prompt action if we can start. Unfortunately, officialdom, not seeing with its own eyes, must be spoon-fed to these statements, and meantime the destruction proceeds."

PROGRESS OF WORK IN FOREST PRODUCTS LABORATORIES.

The Forest Products Laboratories of Canada were established in 1913 under the jurisdiction of the Forestry Branch of the Department of the Interior. As generous offers of co-operation were extended by McGill University, the laboratories have been placed in Montreal, with headquarters on the University campus. Temporary accommodation has been provided pending the construction of a new building. The present building provides general offices, chemical laboratory, photographic room, etc., and an adjoining building is being reconstructed to serve as an experimental paper mill. The University testing laboratory has been placed at the disposal of the laboratories for the work in timber testing. A small sawmill has been constructed on the outskirts of the city for handling wood specimens to be tested in the laboratory. A wood-working shop and machine shop are also available.

Work in the laboratories will be largely devoted to experimental research on wood and the many products which can be manufactured therefrom. Investigations are also being undertaken with a view to extending the knowledge of wood itself, to indicating improved methods for utilizing the raw material furnished by the Canadian forests, and to find ways and means of utilizing the enormous amount of wood which is wasted in the lumber and allied industries.

For the Division of Timber Tests an impact testing machine and a 30,000 lbs. Olsen Universal testing machine have been installed in the McGill University testing laboratory. The additional equipment owned by the University, including a 200,000 lbs. Wicksteed testing machine, a 150,000 lbs. Emery testing machine and a 60,000 lbs. Reihle testing machine have also been placed at the disposal of the laboratories. A comprehensive series of tests

of the "Mechanical and Physical Properties of Canadian Woods, as Determined by Tests on Small, Clear Specimens," has been undertaken and has been in progress for several months past on representative specimens of Douglas fir from British Columbia and Alberta. Later, other species will be tested that the absolute and comparative strengths of Canadian woods will be established for the benefit of the wood-using industries. A second project, to be undertaken in the near future, is the testing of Douglas fir and other species in structural sizes. A third investigation now in progress consists of the testing of commercial pit props and booms, used in large quantities by the mining industries of Canada, and available in immense quantities for export. This represents one phase of the comprehensive investigation of mine timbers being carried on.

The present equipment in the Division of Timber Physics includes apparatus necessary for the study of moisture content, specific gravity, fibre characteristics, and other physical properties of wood. At present, the work is limited to determination of the physical nature of the specimens examined by the Division of Timber Tests. It is hoped to extend the work to include wood seasoning and the many important branches of wood technology.

A separate building is being equipped to permit the carrying on of pulp and paper-making processes on a semi-commercial scale. The equipment will include a paper machine, beaters, and such other apparatus as is necessary to conduct investigations in a thoroughly practical manner.

The Division of Wood Preservation will carry on field tests which should prove of great value. Studies will be made of methods of treating railway ties, telephone poles, mine timbers, etc., and records will be kept of the life of treated and untreated timbers under varying conditions. To this end the co-operation of the railroads and other industries is being solicited.

A number of other Divisions in the field of forest products will be commenced when conditions make such development possible. For the present, a certain amount of work will be undertaken in the chemical study of wood and its products, and the co-operation of our Canadian universities in this work has been solicited. A general study of wood distillation is also being made, and the laboratories were represented at the commercial distillation tests on British Columbia Western yellow pine conducted in North Carolina in August last.

A complete series of wood specimens from all parts of Canada will be collected for exhibition in the Laboratories. A considerable number of specimens are already on hand, and specimens of manu-

factured wood articles, pulp and paper, wood flour, composition boards, artificial silk and the many other products which can be made from wood will be collected for exhibition purposes. In this way a valuable museum of forest products will be available to stimulate the public in conserving our great natural resources.

Col. Thos. H. Tracy writes as follows:—

"Yours of Aug. 22nd and of Nov. 25th received. So far as my observation goes the principal waste to note in British Columbia is in the sawmills. The sawdust is usually burned under the boilers, the slabs and blocks sold for firewood, but all the trimmings are usually burned in expensively constructed burners (some of them costing as high as $50,000). For every 3,000 feet B.M. of lumber produced, I am informed that two loads of wood, equal to nearly 2,000 feet B.M., are wasted.

"The labors of the Forest Products Laboratories may show a way to utilize the waste, but in addition the staff could probably collect information as to any successful methods in use in other places, and all this information should be supplied to the mill-owners, who would be glad to adopt any suitable means of more thoroughly utilizing the products of their mills.

"The British Columbia Government have a forestry department to look after the protection of the forests and reforestation. The Government also has a good Water Department, which is carefully looking after the question of water supply and power."

MEMBERS OF COMMITTEE

C. R. Coutlee,	A. E. Doucet,
H. F. Laurence,	R. S. Lea,
R. McColl,	R. W. Leonard,
R. O. Sweezey,	E. E. Brydone-Jack,
W. H. Breithaupt,	W. R. W. Parsons,
G. A. Bayne,	John Chalmers,
A. J. McPherson,	T. H. Tracy,
J. S. Dennis,	J. B. Challies,
J. B. Hegan,	C. H. Mitchell,
C. E. W. Dodwell,	Wm. McNab.

James White, Chairman.

Mr. White also presented and read a statement from Major R. W. Leonard on the economic situation in regard to the Welland-St. Lawrence Canal and the proposed Georgian Canal.

Mr. White stated that the publication on Canadian Altitudes referred to in the report of the Committee would shortly be ready for distribution. It was proposed to limit the circulation of this work as far as possible to Engineers. He had adopted as datum for the Eastern portion of the Continent the mean sea level as determined at Halifax, and for Ontario and the prairie provinces the New York datum as connected with Rouse's Point was referred to. It was thought that the elevations given would everywhere be reliable within about two feet. Answering a question as to the possibility of establishing a common datum plain for the Continent, Mr. White remarked that this was entirely a matter of co-operation between the several departments on the one hand and the Dominion of Canada and the United States on the other. Col. Anderson remarked that the several excellent determinations of mean sea level made under the direction of the Department of Naval Affairs should be referred to and made available in connection with a Continental system of elevations.

On motion by Mr. White, seconded by Col. Anderson, the report of the Conservation Committee was adopted.

Committee of the Electro Technical Commission.

The following report of the Committee of the Electro Technical Commission was presented by Prof. L. A. Herdt:—

This Committee begs to report that during the early part of the year 1914 the Commission has been largely engaged in collating the various matters which rose out of the 1913 Berlin Congress, and in getting the different subjects assigned to the Sub-Committees in shape for the Committee meetings.

Publications on the following matters have been issued:—

International Symbols—Pub. No. 27.

International Copper Standards—Pub. No. 28.

Nomenclature of Hydraulic Turbines—Pub. No. 29.

Report of Berlin Meeting—Pub. No. 30.

The most important of these is, of course, that on Copper, which marks an epoch in international standardization.

During the latter part of the year the war conditions have, of course, greatly disrupted the International Commission and hampered the work; in fact, at one time it seemed as if the projected 1915 San Francisco Congress would have to be abandoned. Lately matters have improved, and it now appears as if this Congress will take place and the Programme drawn up carried out with but little modification. The General Secretary, Mr. C. Le Maistre, had, however, to cancel a proposed trip to Canada and the States

mentioned in th previous report to the Society, much to the regret of the United States and Canadian Committees.

The Officers and Members of the Canadian Committee remain as at last year, namely:—

L. A. Herdt, Montreal, Chairman.
O. Higman, Ottawa, Vice-Chairman.
H. T. Barnes, Montreal.
W. A. Duff, Winnipeg.
L. W. Gill, Kingston.
J. Kynoch, Toronto.
J. Murphy, Ottawa.
T. R. Rosebrugh, Toronto.
A. B. Lambe, Ottawa, Secretary-Treasurer.

L. A. Herdt,
Chairman.

Ottawa, Jan. 12th, 1915.

On motion by Prof. L. A. Herdt, seconded by Mr. J. A. Duchastel, the report was adopted and the Committee continued.

REPORT OF COMMITTEE ON SPECIFICATIONS FOR CAST-IRON AND STEEL WATER PIPES.

Committee on Cast-Iron and Steel Water Pipes.

Members of Committee—F. H. Pitcher, Chairman; T. C. Irving, Jr., N. J. Ker, A. Currie, C. H. Mitchell, F. X. A. Leofred, C. L. Fellowes.

The report of the Committee on Cast-Iron and Steel Waterpipes was presented by Mr. F. H. Pitcher:—

Your Committee has carefully considered whether or not in view of the best practice in the manufacture of Cast-Iron Water Pipes any revision of the Society's Specifications is desirable, and has come to the conclusion that the Specifications for Cast-Iron Pipe, as at present sanctioned by the Society, meet every requirement.

In regard to the matter of Steel Pipes for Waterworks purposes, it is the opinion of the Committee that the time has not yet arrived for Standard Specifications to be made by the Society. Hundreds of miles of steel water main, both for force mains, principal feeders, distribution pipe, etc., are in successful operation

in this country and elsewhere: but there is not, in the opinion of this Committee, sufficient unanimity among Engineers and the different manufacturers as to Standard practice to establish the drawing up of Specifications which this Society could be recommended to sanction.

The matter is, however, rapidly assuming greater importance and there are signs that Standardization may be possible in the near future.

It would, therefore, seem desirable that the Society should have a Committee on this matter which would keep in touch with the development, and when possible submit Specifications for approval.

Respectfully submitted,

F. H. PITCHER,
Chairman.

On motion by Mr. Pitcher, seconded by Mr. H. M. MacKay, the report was adopted and the Committee continued.

AWARD OF GZOWSKI MEDAL.

The Secretary read the following communication from the Council of the Society: The Council as the result of the report of the Gzowski Medal Committee recommends that the award for the best paper of the year be made to Mr. P. A. N. Seurot, M.Can. Soc.C.E., for his paper on "Sub-aqueous Tunnelling." On the motion of Col. Anderson, seconded by Mr. Doucet, the report was unanimously adopted.

The Secretary also read the report of the Gzowski Medal Committee as to the award of Students' prizes.

On resolution it was resolved that prizes should be given as follows:—

D. Bremner, S.Can.Soc.C.E., for his paper on "The Cost of Modern Houses."

E. E. Watts, Jr.Can.Soc.C.E., for his paper on "An Investigation upon the Treatment of Canadian Zinc Ore."

L. A. Badgley, Jr.Can.Soc.C.E., for his paper on "A Plane Table Survey for Town Planning."

C .A. Macaulay, S.Can.Soc.C.E., for his paper on "The Evolution of Stoping Methods during the last Decade."

The Meeting then adjourned for luncheon.

At 1.30 p.m. a complimentary luncheon by the Residential members to the Visiting members was given in the Rose Room of the Windsor Hotel, and was attended by some 200 members.

AFTERNOON SESSION, JANUARY 26TH, 1915.

The Meeting re-assembled at 3 p.m., the President, Mr. M. J. Butler, C.M.G., in the Chair.

The reports of Committees were continued.

COMMITTEE ON REINFORCED CONCRETE.

Mr. Francis in presenting the report stated that copies of it were now in the hands of the membership. A general discussion of the report took place, and the Chairman of the Committee read a special communication in regard to it from Mr. J. A. Dillabough. The discussion and correspondence in regard to the report were referred to the Committee. On motion by Mr. Francis, seconded by Mr. Bruner, the report was adopted and the Committee continued.*

JUNIOR SECTION.

Mr. A. J. Kelly, as Chairman of the Junior Section, presented the following report on behalf of the Section:—

176 Mansfield Street, Montreal,
January 22nd, 1915.

Committee of the Junior Section—J. H. Norris, R. M. Walker, W. Clerk, B. O. Smith and A. J. Kelly.

The Section held four meetings during the past year and the following papers were read:—

February 26th—"Contracts and Costs of Brick Veneer Building Construction," by Mr. J. H. Norris.

March 17th—"Movable Bridges," by Mr. J. Robertson.

October 27th—"The Moose Jaw Water Supply System," by Mr. R. M. Walker.

December 1st—"The Substructure of the Fraser River Bridge at Fort George," by Mr. H. L. Bodwell.

Respectfully submitted,

BRITON O. SMITH, Secretary. ALBERT J. KELLY, Chairman.

On motion the report was adopted.

* NOTE.—This report having been adopted as a standard specification will be printed for distribution as required.

Mr M. J. Butler, C.M.G., delivered the following address as the retiring President:—

President's Address.

Each succeeding President finds it more difficult to decide upon a subject for the Annual Address. Generally, my predecessors in the Chair have found a technical subject, more or less allied to the work in which he had been engaged.

On this occasion, I venture to depart from the usual course. We meet under unusual world-wide depression of business conditions; our Empire is at war, not of our seeking, but forced upon us, for the preservation of good faith, and in pursuance of treaty obligations, by one of the signatories to the Treaty. It is worth while to know that we are part and parcel of an Empire which regards treaty obligations as something more than a "scrap of paper."

The European war has upset all the business affairs of the world, and marks a stop in the progress of Canada. It seems to me that we may profitably consider where we are at, and what we may look forward to.

I propose, as briefly as possible, to review our progress for the past decade, in transportation, trade, population, with such comments as may elucidate probable future developments.

In 1904 we had 19,431 Miles of Railway in Operation.
In 1913 we had 29,304 Miles of Railway in Operation.

The railway statistics of Canada prior to 1907 failed to supply any detailed information, hence for the purposes of comparison I shall confine myself to the period from 1907 to 1913.

Miles of Track in 1907	=	27,967.
Miles of Track in 1913	=	38,223.
Miles of Railway in 1907	=	22,452.
Miles of Railway in 1913	=	29,304.
Tons Hauled One Mile in 1907	=	11,687,711,830.
Tons Hauled One Mile in 1913	=	23,032,951,596.
Tons Hauled per Mile of Line, 1907	=	518,486.
Tons Hauled per Mile of Line, 1913	=	785,820.
Freight Train Mileage, 1907	=	38,923,890.
Freight Train Mileage, 1913	=	67,320,090.
Average Tons per Train, 1907	=	260.
Average Tons per Train, 1913	=	342.
Average Tons per Car, 1907	=	15.37.
Average Tons per Car, 1913	=	19.01.
Average Receipt Per Ton Mile, 1907	=	0.815c.

Average Receipt Per Ton Mile, 1913	=	0.758c.
Revenue from Freight, 1907	=	$94,995,087.
Revenue from Freight, 1913	=	$174,684,640.
Gross Earnings per Mile, 1907	=	$6,535.63.
Gross Earnings per Mile, 1913	=	$8,750.50.
Earnings per Train Mile, 1907	=	$1.953.
Earnings per Train Mile, 1913	=	$2.264.
Expenses per Train Mile, 1900	=	$0.864.
Expenses per Train Mile, 1904	=	$1.216.
Expenses per Train Mile, 1907	=	$1.381.
Expenses per Train Mile, 1913	=	$1.604.

It will be observed that the cost of running trains per mile since 1904 has increased 31%, and that in the past 13 years the increase has been 85%. The percentages for the period from 1899 to 1913 were for earnings, an increase of 89.8%, and for expenses 105.9%.

In 1907, 124,012 men were in the employ of the railways, earning $58,719,493, or 56.7% of the operating cost.

In 1913, 178,652 men earning $115,749,825, making 63.59% of the operating expenses.

Nominally, there are 193 railways in Canada. Actually, they may be considered as being comprised into a few great systems in order of magnitude: The Canadian Pacific, the Grand Trunk and Grand Trunk Pacific, the Canadian Northern, the Government Railway, the Great Northern, and one Province-owned, the Temiskaming and Northern Ontario. The Algoma Central and the Sydney and Louisburg owing to being allied with great industrial undertakings may remain independent. All of the remaining lines are in due course to be absorbed by these great corporations.

It is proper to remark that we in Canada have the greatest railway mileage per head of population of any country in the world, with three Transcontinental Railways with terminals at tide water on the Atlantic and Pacific. As might have been expected, the Engineering profession has profited by such an extensive railway building programme. It is now at an end, and the conditions for the employment of Engineers are bad; hence, as intelligent men, some other field of occupation must be sought. A close study of the statistics discloses that good service is rendered at reasonable cost. The traffic density is increasing and hence the railways may look forward to prosperity as soon as business resumes its normal condition. Fundamentally, Canada is an agricultural country, with resources in mines, forests, and manufacturing, and the inter-

relationship of all kinds of employment is essential to the well-being of the country. Not every man is suited to a farmer's life. Sons and daughters seek the work they are naturally adapted to, hence sectional appeals to the Government should be frowned upon, and such action taken by wise adjustments of the tariff as will insure to us a well rounded life work. Nevertheless, the greatest problem before the country is the transportation question. So far as I am aware of, Canada is unique in this regard. It is the only country I know of where, politically and otherwise, we must, to preserve our independent action, fight against geography. It is well known to all of you as a physical law, that forces all tend to move along the lines of least resistance. We have, as a nation, undertaken the task of forcing our outlets against the lines of least resistance. The Atlantic seaboard is the outlet for the products of the prairies situated some 1,500 miles inland, and our efforts in building railways with easy curves and grades, the enlargement of our canal system, the improvement of rivers, and particularly of the St. Lawrence route, have but the one object, to put a few cents more per bushel into the pockets of our farmers. The enlargement of the Welland Canal will allow the larger type of ship of 300,000 bushels capacity to pass down Lake Ontario and the River St. Lawrence to within 120 miles of Montreal. Great storage elevators will be erected at or near Prescott, and 1,000-ton barges will be towed through the present canal system to Montreal. Each incoming ship is known for days ahead, and the exact cargo of grain required can be in waiting for transfer by floating elevators. Ultimately, however, the larger ship will come through to Montreal, as it is quite practicable and within the resource of the country to convert the St. Lawrence River into slack water navigation, by the building of eight dams, with duplicate locks, and as an incident thereof, develop the greatest water powers in the world, aggregating over 4,000,000 h.p., eliminate the ice jams, and make practicable the navigation of the river in winter by the aid of powerful ice breakers.

It is a duty our Government may well undertake at the earliest possible moment, to secure a hydrographic and topographic survey of the St. Lawrence, so that accurate estimates of cost may be made, and that proper regulations may be drawn to so regulate proposed power developments owned by private corporations, that each may be brought into a component part of the completed whole.

It would be difficult to place a limit on the possibilities of such a power development situated on the greatest transportation route in the world. Cheap and abundant power means so much to a country.

TRADE:—Our trade has grown by leaps and bounds during the period under review.

EXPORTS TO—

Year.	United Kingdom	United States	Other Countries	Total
1900	$96,562,875	$52 534,977	$14,412,938	$163,510,790
1914	$215 253,954	$163,372,690	$52,961,795	$431,588,439

IMPORTS FROM—

Year.	United Kingdom	United States	Other Countries	Total
1900	$44,279,983	$102,080,177	$26,146,718	$172,506,787
1914	$131,942,249	$395,565,328	$90,821 277	$618,328,874

The feature which concerns us closely is the growth of manufacturing and the development of mining products:—

STATISTICS OF MANUFACTURES, 1900 TO 1910—

	1900	1910	Increase %
Establishments	14,650	19,218	31.18
Capital	$446,916,487	$1,247,583,609	179.15
Employees on Salaries	30,691	44,077	43.61
Salaries	$23,676,146	$43,779,715	84.91
Employees on Wages	308,482	471,126	52.72
Wages	$89,573,204	$197,228,801	120.19
Raw and Partly Manufactured Materials	$266,527,858	$601,509,018	125.68
Products	$481,053,375	$1,165,975,639	142.38

MINERAL PRODUCTION—

	1900	1910	Increase %
Mines and Works	1,373	2,222	61.84
Value of Buildings and Plant	$42,771,803	$108,506,051	153.68
Employees on Salaries	1,527	2,884	89.86
Salaries	$1,512,821	$3,317,030	119 26
Employees on Wages	37,065	67,150	81.16
Wages Paid	$16,336,273	$39,129,941	139.53
Value of Products	$47,956,862	$122,004,932	154.40

A marked feature of our trade is the importation of steel products and manufactures of which steel is the important constituent. For the year 1911 we brought in $85,319,541, of which $11,448,428 were on the free list. We also imported fire clay and fire brick to the value of $994,193, all of which was on the free list. I have no desire to infringe upon the boundary line of politics, but may be permitted to point out that such a tremendous balance of trade against us is one that thoughtful men may well ask, how is it to be dealt with? I venture to say that by careful re-adjustments of the tariff quite 50% of the importations may be profitably carried on in Canada. We have been large borrowers in the world's markets, spending money lavishly, and on the whole, wisely; here and there over-capitalized, ill-considered industrials will be found, but the time has arrived when we must economize, pay our way, write down inflated capital, and show the loaning world Canada is solvent, and worthy of the trust and confidence shown us. I have no doubt of the ultimate result. Our resources of unworked land, our mines, forests and fisheries will afford homes and opportunities for millions of men. In 1901 our population was 5,371,315, of which 3,349,516 were rural and 2,021,799 were urban; in 1911 our population was 7,206,643, of which 3,925,679 were rural and 3,280,964 were urban. It will be noted that barely 600,000 additional was made to the rural population, whereas the great increase flocked to the cities, towns, etc. This is not satisfactory, and efforts will be needed to bring more people to the land.

In concluding his address, Mr. Butler referred to the death during his term of office of two past presidents of the Society, Mr. T. C. Keefer, C.M.G., and Dr. J. Galbraith. Mr. Keefer, the first President of the Society, was a great man and a great Engineer. Dr. Galbraith was a man who had endeared himself to a large number of members of the Society. His work was well done and would live after him.

Mr. John Kennedy expressed his personal gratitude for the valuable records that the President had compiled, and moved that the thanks of the Society be tendered to him for them. This motion was seconded by Col. Anderson, and being put to the Meeting by the Secretary was carried unanimously.

The President requested the Meeting to name a member who would frame a cablegram in reply to that received from Col. Mitchell which had been read at the opening of the morning session. Mr. Oliver suggested that the message should include those other members of the Society who were in England, preparing to go to France in defence of their Country. Mr. Francis suggested

that a message should also be sent to those members of the Society who were serving with the French Army. These proposals were unanimously agreed to and Messrs. Francis and Oliver were named to draft the messages.

The meeting was then adjourned to January 27th, at 3 o'clock.

Tuesday Evening, January 26th, 1915.

A Smoker was held in the Society's Rooms under the direction of a Committee of local members. During the evening Mr. H. T. V. Meurling gave an interesting address on "Submarine Mining Methods in Warfare."

Wednesday Morning, January 27th, 1915.

On the invitation of the Cedars Rapids Manufacturing and Power Company, a party of 50 members visited the works of the Company at Cedars. The Grand Trunk Railway Company placed a special train at the disposal of the party to convey them to and from Cedars Station. Sleighs were provided by the Cedars Rapids Company to carry the members to the works. The Contractors, Messrs, Fraser, Bryce and Company, entertained the party at luncheon in the Power House. Another and larger party of the Society visited the Angus shops, to which they were conveyed by special train provided by the Canadian Pacific Railway Company.

Wednesday Afternoon, January 27th, 1915.

The meeting was called to order at 3 p.m., the President, Mr. Butler, in the chair.

The reports of Committees were continued.

General Clauses for Specifications.*

Mr. H. Holgate presented the report of the Committee on General Clauses for Specifications. The report, which had already been distributed to the membership, was taken as read. Mr. Holgate stated that the specification clauses presented were in the nature of a progress report, and had been placed before the members for discusssion and their recommendation. At the request of Mr. Holgate, Mr. H. R. Safford read a letter in discussion of the report. Mr. G. H. Duggan followed in criticism of several of the suggestions of the Committee, and a discussion was taken part in generally by the members present. On motion by Mr. D. Macpherson, seconded by Mr. S. B. Clement, the Committee was re-appointed and the report referred back to it. The Committee was empowered to add Mr. G. H. Duggan and Mr. H. R. Safford to its membership.

* Note.—This report having already been distributed is not reproduced here.

On the suggestion of Mr. John Kennedy the Committee was authorized to employ a Solicitor to assist in the work.

The Committee as reconstituted is as follows:—

Mr. H. Holgate, Chairman.	Mr. J. G. G. Kerry,
" E. G. M. Cape,	" G. H. Duggan,
" R. de L. French,	" H. R. Safford.
" W. Chipman,	

COMMITTEE ON RAILS.

The President, Mr. M. J. Butler, presented the report of this Committee.

MEMBERS OF THE COMMITTEE:

M. J. Butler,	G. A. Mountain,
J. M. R. Fairbairn,	A. F. Stewart,

H. G. Kelley, Chairman.

The Rail Committee begs to report as follows:—

In recent years a great deal of work has been done toward the improvement and standardization of rail specifications, both individually and through the American Railway Engineering Association, which has a committee at work composed of a number of the best known Engineers in America, under whose supervision a specially qualified Engineer and Metallurgist has been employed to devote his whole time to the compilation of data, both from actual results obtained through reports from the various railways and from tests of various kinds which he has made with the co-operation of the manufacturers.

Marked advances have been made in the rail specifications as now adopted by the American Railway Engineering Association, these covering both chemistry and mill practice, and your Committee feel that they cannot do better at the present time than recommend the adoption by the Canadian Society of Civil Engineers of the so-called "A.R.E.A." rail specification, a copy of which is attached hereto.

Yours truly,

HOWARD G. KELLEY, Chairman.

On motion by Mr. G. A. Mountain, seconded by Mr. T. A. Tomlinson, the report of the Committee was adopted and the standard specification of the American Railway Engineering Association approved as the standard specification of this Society.*

*NOTE.—The A.R.E.A. specification for Carbon Steel Rails, having been distributed to the membership with the Reports of Committees, is not reproduced here.

Committee on Track.

Mr. H. R. Safford presented the report of the Committee on Track, and outlined the proposals of the Committee as regards future work, in accordance with the report already in the hands of the membership. Mr. Safford moved, seconded by Mr. D. MacPherson, that the report be approved and the Committee continued. Motion adopted.

The meeting was then adjourned to Thursday, January 28th, at 10 o'clock.

Wednesday Evening, January 27th.

The Members' Dinner was held at the Engineers' Club. The President, Mr. Butler, occupied the chair.

The chief guest of the evening was the Hon. Sir Geo. E. Foster, K.C.M.G. There was a large attendance.

Thursday Morning, January 28th.

The meeting was called to order at 10 a.m. Mr. Butler in the Chair.

The President asked for nominations for membership of the Committee charged with the nomination of Officers and Members of the Council for the year 1916. The Secretary read the following nominations:—

By the Council of the Society for District No. 1—Messrs. C. M. Monsarrat and J. C. Smith.

By the Members of Council residing in the Maritime Provinces—Messrs. W. A. Hendry and C. W. Archibald.

By the Quebec Branch for District No. 3—Mr. S. S. Oliver.

By the Ottawa and Kingston Branches for District No. 4—Mr. L. W. Gill.

By the Toronto Branch for District No. 5—Mr. E. W. Oliver.

By the Edmonton, Calgary and Winnipeg Branches for District No. 6—Messrs. J. S. Dennis and H. N. Ruttan.

By the Victoria and Vancouver Branches for District No. 7—Mr. R. W. Macintyre.

There were no nominations by the members present at the meeting. A ballot was ordered and Mr. Wm. McNab and Mr. A. St. Laurent were appointed scrutineers.

As the result of the ballot, the President declared the following elected members of the Nominating Committee:—

For District No. 1.....Mr. C. N. Monsarrat
For District No. 2.....Mr. W. A. Hendry
For District No. 3.....Mr. S. S. Oliver
For District No. 4.....Mr. L. W. Gill
For District No. 5.....Mr. E. W. Oliver
For District No. 6.....Mr. H. N. Ruttan
For District No. 7.....Mr. R. W. Macintyre.

Prof. H. E. T. Haultain referred to the important announcement which had been made by the President at the dinner on the previous evening, namely, the institution of two medals for original work, one in the Department of Mining by Major Leonard, and one in Metallurgy or Chemistry by Mr. J. H. Plummer, D.C.L. These medals would, in his opinion, prove of enormous advantage to the profession, and he hoped that a larger number of Engineers engaged in these classes of work would become interested in the Society.

Mr. F. C. Gamble moved the following resolution:—"This meeting, being heartily in accord with the suggestion that the term "Civil Engineer" be given a legal definition, expresses a wish that the incoming Council would give the matter its early consideration to the end that the Governments will be induced, in justice to the profession of Civil Engineering, to accept the definition proposed, and amend such public acts as may be necessary to give legal effect to such definition." Mr. E. W. Oliver seconded the motion. A discussion followed. The motion was put to the meeting and carried by a majority of votes.

The President presented the Gzowski Medal to Mr. Seurot for his paper on "Sub-aqueous Tunnelling," and congratulated him.

Mr. Seurot expressed his appreciation of the honour bestowed upon him.

The report of the Scrutineers on Amendments to By-Laws was presented.

The President announced that the result of the ballot was to adopt the proposals submitted by the Council, thus amending By-Laws No. 8, 19, 20, 21, 22, 23, cancelling the old By-Law No. 21a and adopting a new By-Law No. 56.

The new form of the Code of Ethics was also declared to have been approved.

The report of the scrutineers for the ballot for Officers and Members of Council was presented, and the President declared the following elected:—

As President .....Mr. F. C. Gamble
Vice-President for term of three years.....Mr. A. St. Laurent
Vice-President for term of one year.....Mr. E. E. Brydone-Jack

As Councillors Representing:—

District No. 1	Mr. S. P. Brown, Mr. Arthur Surveyer
District No. 2	Mr. C. B. Brown
District No. 3	Mr. T. A. J. Forrester
District No. 4	Mr. A. A. Dion
District No. 5	Mr. J. L. Weller
District No. 6	Mr. W. G. Chace
District No. 7	Mr. N. J. Ker

On invitation of the retiring President, the newly elected President, Mr. F. C. Gamble, took the Chair, and addressed the meeting as follows:—

"I am deeply sensible of the honour you have done me in selecting me as your President for this year, and fully realize the responsibilities attached to this distinguished position.

"In accepting the nomination to the presidency, the highest mark of approbation in the gift of the Society, and therefore the most enviable one, I felt it was not altogether a personal tribute, but rather a frank and thoughtful intention to recognize the claims of the Farther West, and thereby draw closer the bond of sympathy and interest which should exist between the members living at the extremes, and throughout the whole length of our country. Those residing in the West are strong and fervent in their loyalty to the parent society, and are actuated by the desire to advance by every means in their power its usefulness to the members and the country, increasing thereby its activities and authoritativeness. They look forward with confidence to the day when the Society by the individual and collective loyal efforts of all its members will attain the dignity of a great and influential national Society of Civil Engineers. This is the purpose for the attainment of which we must always strive. Once achieved, all governments, federal, provincial and municipal—private interests will see the advantage of doing likewise—will be compelled to recognize the weight and power of our Society, and, making a virtue of necessity, refer to us in the consideration and in the design of all public works having to do with the advancement, safety and health of the people.

"By being constant to our profession, loyal to each other, and to the Society, and mindful of our separate personal responsibilities, there cannot exist a doubt as to our ultimate success.

"The words of Sir Francis Bacon, familiar to you all, the great and wise philosopher, who lived over three hundred years ago, seem peculiarly apt now: 'I hold every man a debtor to his pro-

fession, from the which as men of course, will seek to receive consequence and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto.' "

Mr. Gamble stated that he desired to impress on every member of the Society the importance of a summer meeting at Victoria. He hoped very sincerely that a large number would come to the coast, and on behalf of the members resident there he extended a cordial invitation to all.

Mr. Henry Holgate moved that the Society place in its building a memorial to the late Mr. T. C. Keefer, the first President of the Society, the memorial to take such form as the Council might deem most fitting, the expenses in connection with the same to be met either by a voluntary subscription or from the Society's funds as the Council might decide. His motion was seconded by Mr. John Kennedy, who suggested that a Committee be formed to draw up a memorial of Mr. Keefer's life. Mr. Francis seconded the proposal made by Mr. Kennedy, and both motions were carried unanimously.

On motion by Mr. Seurot, seconded by Mr. Safford, the thanks of the Society were accorded to the retiring President, Mr. Butler, and to the Council, for their arduous services on behalf of the Society during the past year. Carried unanimously.

On motion by Mr. G. A. Mountain, seconded by Colonel Anderson, the thanks of the meeting were accorded to the Reception and Introduction Committee for their very effective services. Votes of thanks were also tendered to the following corporations who had so generously contributed towards the success of the meeting:—The Canadian Pacific Railway Co.; the Grand Trunk Railway Co.; the Railways of the Eastern Passenger Association; the Cedars Rapids Manufacturing and Power Co.; and Messrs. Fraser, Brace & Co.

Mr. W. Chipman called the attention of the Council to the desirability of placing the names of the past Presidents of the Society on their portraits in order that they might be recognized by all who visited the Lecture Hall.

On the report of the sub-committee appointed the following form of words was adopted as a message to the members of the Society engaged in serving their country on the Continent:—"The Annual Meeting of the Canadian Society of Civil Engineers desires to convey to you and other members of the Society serving with the Allied Forces their best wishes."

The meeting then adjourned.

The Canadian Society of Civil Engineers

176 Mansfield Street, Montreal

Established February 24th, 1887.
Incorporated by Dominion Act, June 23rd, 1887
(50 Vic., Cap. 124)

REPORT

OF

ANNUAL MEETING

1916

Volume XXX

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The Canadian Society of Civil Engineers.

REPORT OF PROCEEDINGS OF THE THIRTIETH ANNUAL MEETING HELD AT THE SOCIETY'S HOUSE, 176 MANSFIELD STREET, MONTREAL, 25TH to 27TH JANUARY, 1916.

MORNING SESSION, 25TH JANUARY, 1916.

The Meeting was called to order at ten o'clock a.m. Mr. F. C. Gamble, President, occupied the Chair.

The minutes of the last Annual Meeting were read and approved.

Resolution re honour of knighthood conferred on members of the Society.

The following resolution was proposed by Mr. G. R. G. Conway, seconded by Prof. H. E. T. Haultain, and was unanimously and enthusiastically carried by a standing vote:—

"That this meeting extends to Sir John Kennedy, Past President and Hon. Member; Sir Collingwood Schreiber, Honorary Member; and to Sir Alexander Bertram, Member, its heartiest congratulations upon the order of Knighthood recently bestowed upon them by His Majesty the King.

"The Society also wishes to place upon record its appreciation of the royal and public recognition the engineering profession has received by the honours conferred upon its distinguished members who have always maintained the highest ideals of the profession. It recognizes, too, in the bestowal of these honours the growing public recognition of the engineers' influence not only in the arts of peace but also in the great ordeal the Empire is passing through at the present time."

SIR JOHN KENNEDY.—Mr. President and Gentemen.—"I wish to thank the members of this Society for their expression of goodwill and kindness. I am sure it is very gratifying; so much so that it is embarrassing, and I can only just thank you very heartily fo myself, and I may also say for Sir Collingwood Schreiber and Sir Alexander Bertram. I look upon it as an honour to the engineering profession, as set forth in the resolution. That is the

right way to look upon it, and I have therefore felt all the higher appreciation for the honour done to us and Canadian engineers in general."

The Secretary then read a telegram from General C. J. Armstrong, Chief Engineer, Canadian Army Corps, as follows:—

> "Please thank members for generous contributions Engineers' hospital fund. Greetings from all members serving Canadian Engineers to comrades at Meeting."

It was unanimously decided to send the following message in reply:—

> "Members attending the Annual Meeting Canadian Society of Civil Engineers send good wishes to members at the Front in defence of the Empire. May you speedily return to us victorious."

By special resolution the same message was also telegraphed to Lt.-Col. C. H. Mitchell.

After some discussion, the President named the Auditors of the Society, Messrs. Riddell, Stead, Graham & Hutchison, represented by Mr. Pope, as scrutineers for the ballots for the election of Officers and Members of Council and for the amendments to by-laws.

REPORT OF COUNCIL FOR THE YEAR 1915.

The Council presents the following report on the work of the Society during the past year:—

Roll of the Society.

Elections during the year resulted in the following additions to the Roll:—Fourteen Members, sixty-six Associate Members, two Associates, twenty-three Juniors and forty-two Students. One former Member was reinstated.

The following transfers were made:—Seventeen Associate Members to the class of Member, twelve Juniors and nineteen Students to the class of Associate Member, and ten Students to the class of Junior.

There have been removed from the rolls by resignation or on account of non-payment of dues, five Members, thirty-four Associate Members, three Associates, eleven Juniors and fifty-one Students. These resignations were due either to the fact that those concerned had ceased active engineering work or were, owing to lack of em ployment, unable to pay the annual dues.

The following deaths, twenty-seven in number, have been re ported:—

Honorary Members....	Sir Sandford Fleming
	Keefer, Thos. C., C.M.G.
Members.....	Belcher, John E.
	Forrest, Horatio Fred.
	Grundy, George C.
	Rielle, Joseph
	♂ Janin, George
	Johnson, Lacey R.
	Leofred, F. X. Alfred
	♂ Roy, Adolphe V.
Associate Members..	♂ Cowen, Reginald Percival
	♂ Delepine, H. G. S.
	Elmsley, R. Sherwood
	Genest, Arthur T.
	Luther, C. Martin
	Michaud, Joseph Louis
	♂ Morrison, Thomas E.
	Newlands, John E.
	♂ Revell, George E.

♂ Killed in action or died as a result of wounds.

Associate ..... Sir William C. Van Horne, K.C.M.G

Juniors ..... ♂ Bell-Irving, Duncan P.
♂ Campbell, Thomas Callander
♂ Duggan, Herrick S.
♂ Helliwell, Joseph G.
♂ Rosher, John H.

Students ..... Dombrowski, P.
♂ Fyshe, Francis

At present the membership stands as follows:—

Honorary Members	8
Members	693
Associate Members	1,409
Associates	34
Juniors	357
Students	575
Total	3,076

The membership of the Branches at the date of the last Annual Meeting was as follows:—

	Corporate.	Non-Corporate.	Total.
Quebec	51	28	79
Ottawa	161	55	216
Kingston	14	13	27
Toronto	138	104	242
Manitoba	101	48	149
Calgary	41	6	47
Vancouver	112	20	132
Victoria	52	9	61
Edmonton	32	8	40
Regina	23	4	27
	725	295	1,020

Annual Meeting

The twenty-ninth Annual Meeting was held at 176 Mansfield Street, Montreal, in January, 1915, under the presidency of Mr. M. J. Butler, C.M.G.

The first session was called to order on Tuesday, January 26th, at 10 a.m., and the meeting was adjourned on Thursday afternoon, January 28th.

♂ Killed in action or died as a result of wounds.

Meetings

The Council held twenty meetings during the year.

There have been three sectional meetings, eight monthly meetings, and two Junior Section meetings of the Society.

The following papers and addresses were presented at these meetings:—

"Movable Dams," by Mr. H. B. Muckleston, M.Can.Soc.C.E.

"Shell Manufacture," by Mr. H. H. Vaughan, M.Can.Soc.C.E.

"Lethbridge Sewage Disposal Works," by Mr. A. C. D. Blanchard, M.Can.Soc.C.E.

"Heavy Guns Used in the Field," by Col. Lacey R. Johnson, M.Can.Soc.C.E.

"The Jordan River Power Development," by Mr. Chas. A. Lee, A.M.Can.Soc.C.E.

"Edmonton's Tunnel Sewerage System," by Mr. A. J. Latornell, A.M.Can.Soc.C.E.

"Tests on Shearing Resistance of Reinforced Concrete Beams," by E. Brown, A.M.Can.Soc.C.E., H. M. MacKay, M.Can.Soc.C.E., and C. M. Morssen, M.Can.Soc.C.E.

"Decay in Wood." Discussion on, introduced by Mr. F. B. Brown, M.Can.Soc.C.E.

"The Stave Falls Power Development of Western Canada Power Company, Limited," by Mr. R. F. Hayward, M.Can.Soc.C.E.

"Aviation," by Mr. J. A. D. McCurdy.

"The Development of Power in the St. Lawrence River at Cedars Rapids by the Cedars Rapids Manufacturing & Power Company," by Mr. Henry Holgate, M.Can.Soc.C.E.

"Constant Voltage Operation of a High Voltage Transmission System," by Dr. L. A. Herdt, M.Can.Soc.C.E., and Mr. E. G. Burr, A.M.Can.Soc.C.E.

"Hydraulic Development and Construction at Cedars Rapids," by Mr. J. C. Smith, M.Can.Soc.C.E.

"Electrical Design and Construction of the Cedars Rapids Manufacturing and Power Plant," by Mr. R. M. Wilson, M.Can. Soc.C.E.

"The Sea Sled," by Mr. B. O. Smith, Junior Can.Soc.C.E.

"The Cost of Modern Houses," by Mr. D. Bremner, S.Can. Soc.C.E.

Branch Societies

The several Branches of the Society, their Headquarters and Officers at this date are as follows:—

Vancouver —Headquarters, Metropolitan Building.
Chairman, R. F. Hayward.
Sec.-Treas., A. K. Robertson.

Manitoba —Headquarters, University of Manitoba, Winnipeg.
Chairman, W. G. Chace.
Sec.-Treas., A. W. Smith, Room 454, Union Station.

Toronto —Headquarters, Engineers' Club, King Street West.
Chairman, J. R. W. Ambrose.
Sec.-Treas., C. H. R. Fuller, 106 Kendal Ave.

Ottawa —Headquarters.
Chairman, John Murphy.
Sec.-Treas., J. B. Challies, Room 404, Union Bank Bldg.

Kingston —Headquarters, School of Mines.
Chairman, W. P. Wilgar.
Sec.-Treas., L. W. Gill.

Quebec —Headquarters, City Hall. (Address Box 115).
Chairman, S. S. Oliver.
Sec.-Treas., I. E. Vallée.

Victoria —Headquarters, 408 Belmont House. (Address P.O. Box 1290).
Chairman, D. O. Lewis.
Sec.-Treas.. R. W. Macintyre.

Calgary —Headquarters. (Address Box 2318).
Chairman, Wm. Pearce.
Sec.-Treas., S. G. Porter.

Edmonton —Headquarters, University of Alberta. (Address Box 957).
Chairman, A. T. Fraser.
Sec.-Treas, L. B. Elliot.

Regina —Headquarters.
Chairman, O. W. Smith.
Sec.-Treas., J. N. de Stein, 2123 Retallack St.

Committees.

The following have been the Committees of Council during the year:—

Library and House Committee:

J. M. R. Fairbairn, Chairman.
F. P. Shearwood.
A. Surveyer.
S. P. Brown.
R. J. Durley.

Finance Committee:

R. A. Ross, Chairman.
C. N. Monsarrat.
G. H. Duggan.
H. H. Vaughan.
E. Marceau.

Committee on Meetings:

W. J. Francis, Chairman.
The Chairmen and Vice-Chairmen of Sections, and the Chairmen of Branches.

The Board of Examiners for admission of candidates under by-laws 8 and 9 was as follows:—

H. M. MacKay, Chairman.
A. Surveyer, Secretary.
R. S. Lea.
A. R. Roberts.
J. M. R. Fairbairn.
J. Flahault.
M. Beullac.

Committee on Gzowski Medal and Prizes for Students' Papers:—

A. St. Laurent, Chairman.
H. E. T. Haultain.
E. E. Brydone-Jack.
W. F. Tye.
R. M. Wilson.
A. B. Lambe.
Phelps Johnson.
C. N. Monsarrat.

Officers of Sections.

General:

W. J. Francis, Chairman.
S. P. Brown, Vice-Chairman.

Electrical:

R. M. Wilson, Chairman.
J. C. Smith, Vice-Chairman.

Mechanical:

H. H. Vaughan, Chairman.
J. M. Robertson, Vice-Chairman.

Mining:

J. B. Porter, Chairman.
H. E. T. Haultain, Vice-Chairman.

Committee on Publications:

H. M. MacKay, Chairman.
S. P. Brown.
A. Surveyer.
H. E. T. Haultain.
A. A. Dion.
G. H. Duggan.

The following have been the Committees of the Society during the year:—

Nominating Committee for Officers and Members of Council for the year 1915:

C. N. Monsarrat, Chairman, representing District No. 1.
W. F. Tye,
Phelps Johnson,
M. J. Butler, C.M.G., } Past Presidents.
W. A. Hendry, representing District No. 2.
S. S. Oliver, " " " 3.
L. W. Gill, " " " 4.
E. W. Oliver, " " " 5.
H. N. Ruttan, " " " 6.
R. W. Macintyre, " " " 7.

Cement Specifications:

E. Brown, Chairman.
G. E. Perley.
W. J. Francis.
J. A. Jamieson.
J. A. DeCew.
P. Gillespie.

Educational Requirements:

E. Marceau, Chairman.
R. W. Leonard.
W. F. Tye.
H. M. MacKay.
J. B. Porter.
H. Holgate.
H. Irwin.
A. Surveyer.

Sewage Disposal and Sanitation:

A. Surveyer, Chairman.
John Kennedy.
W. Chipman.
C. H. Rust.
W. Muir Edwards.
J. O. Meadows.
R. S. Lea.
A. F. Macallum.
A. J. McPherson.
P. Gillespie.
W. S. Lea.
T. Lafreniere.

Steel Bridge Specifications:

P. B. Motley, Chairman.
C. N. Monsarrat.
F. P. Shearwood.
J. G. LeGrand.
G. H. Duggan.
N. M. McLeod.
H. G. Kelley.
W. A. Bowden.
F. C. McMath.

Conservation:

James White, Chairman.
C. R. Coutlee.
H. F. Laurence.
R. McColl.
R. O. Sweezey.
W. H. Breithaupt.
G. A. Bayne.
A. J. McPherson.
J. S. Dennis.
J. B. Hegan.
C. E. W. Dodwell.
H. J. Cambie.
A. E. Doucet.
R. S. Lea.
R. W. Leonard.
E. E. Brydone-Jack.
W. R. W. Parsons.
John Chalmers.
T. H. Tracy.
J. B. Challies.
C. H. Mitchell.
Wm. McNab.
E. T. P. Shewen.

The Electro-Technical Commission:

L. A. Herdt, Chairman.
O. Higman.
H. T. Barnes.
L. W. Gill.
W. A. Duff.
L. A. Rosebrugh.
J. Kynoch.
J. Murphy.
A. B. Lambe.

Reinforced Concrete:

W. J. Francis, Chairman.
C. M. Morssen.
C. N. Monsarrat.
H. M. MacKay.
P. B. Motley.
E. Brown.
S. Baulne.
E. S. Mattice.
E. E. Brydone-Jack.
H. Rolph.
P. Gillespie.

General Clauses for Specifications:

H. Holgate, Chairman.
E. G. M. Cape.
R. De L. French.
W. Chipman.
J. G. G. Kerry.

Cast Iron Water Pipes and Specials:

F. H. Pitcher, Chairman.
T. C. Irving, Jr.
N. J. Ker.
A. Currie.
C. H. Mitchell.
C. L. Fellowes.

Roads and Pavements:

W. A. McLean, Chairman.
G. G. Powell.
F. W. Doane.
W. P. Brereton.
G. Henry.
A. F. Macallum.
A. J. McPherson.
E. A. James.
J. Duchastel.
J. E. Griffith.
C. H. Rust.

The awards of the Gzowski Medal and of prizes for the best students' papers will be announced during the annual meeting.

As no papers have been presented on mining or metallurgical subjects during the year, there will be no award of medals in these subjects.

The following is a detailed statement of elections which have taken place since the issue of Bulletin No. 11:

October 19th, 1915.

Associate Members:

Baggs, E.
Fisher, S. J.
Gibeau, H. A.
Gill, J. E.
Lefebvre, J. A.

Juniors:

Milne, J. E.

Transferred from the Class of Associate Member to that of Member:

Amos, L. A.
Fergusson, H. B.
Steeves, C. McN.

Transferred from the Class of Student to that of Associate Member :

Blais, R.
Cousineau, A.
Grieve, J.
Langlais, A. Z.

Students :

Alberga, G. F.
Dorken, H. W.
Lemay, V.

November 16th, 1915.

Members :

Acres, H. G.
Mason, W. McG.

Associate Members :

Bowie, J.
Brakenridge, C.
Cameron, C. S.
Connell, C. H. N.
De Blois, T. M.
Dickson, W.
Henderson, C. E.
Livingston, G. T.
Montizambert, G. C. P.
Philips, H. S.
Reid, A. C.
Stirrett, G. P.
Van Scoyoc, H. S.

Juniors :

Bunting, H. L.
McLaren, W. C.

Transferred from the Class of Associate Member to that of Member :

De Stein, J. N.

Transferred from the Class of Junior to that of Associate Member :

Horne, E. W.
Sherman, N. C.

Transferred from the Class of Student to that of Associate Member :

Barrette, A. O.
Ewing, W. A.
Wykes, H.

Students:

Alberga, A. M.
Anderson, A. M.
Ball, S.
Bayne, C. MacV.
Dawson, J. K.
Haney, R. F.
Hugo, R.
Kirkpatrick, P. C.
McAvoy, R.
Murray, Jas.
Ryan, C. W.
Stewart, A. E.
Thorn, G. O.
Tison, M.

December 21st, 1915.

Members:

Fortin, S. J.

Associate Members:

Attwood, C. H.
Dallyn, F. A.
d'Orsonnens, A. d'O.
Fox, C. J.
Kinghorn, B. H.
Lachance, J. O.
Macleod, J. S.
Perrin, A. T.
Peters, G. M.
Swan, H. L.

Juniors:

Altherr, E.
Bernier, J. A.
Goodman, H. M.
Kolling, P. I.
Parker, G. C.
West, C. W.

Transferred from the Class of Junior to that of Associate Member:

Taylor, W.

Transferred from the Class of Student to that of Associate Member:

Murphy, E. P.

Transferred from the Class of Student to that of Junior:

Adsett, F. C.

Students:

Allan, E. B.
DeCew, L.
Gilley, J. R.
Hughes, C. A.
MacLean, D. G.
Pringle, J. E.
Tanton, J. F.
Tilston, C. E.
Ward, R. C.

As reported in Bulletin No. 11, the Committees on Track and on Rails have been discontinued for the present in view of the fact that the functions of these Committees are overlapped by the similar Committees of the American Railway Engineering Association.

A Committee on Roads and Pavements has been added to the list of those named at the Annual Meeting.

The Committee on Cement Specifications, which has been reconstituted, has presented a report with a proposed standard specification. This report and specification are distributed herewith. The specification will come before the Annual Meeting for discussion and adoption. Reports have also been distributed to the membership for consideration in advance of the Annual Meeting by the Committees on Conservation, Roads and Pavements, the Electro-Technical Commission, Steel Bridge Specifications, and Educational Requirements.

Early in the year the Council made a representation to the Department of Railways and Canals, at Ottawa, to the effect that the Society's Specification for Steel Bridges should be adopted by the Dominion Government. The matter is still under the consideration of the Chief Engineer of the Department.

The special September meeting of the Council, in connection with which during the past two years the travelling expenses of members from outside points have been paid by the Society, was not convened this year owing to the financial situation. The Council, however, considers that in view of the importance of unifying the interests of the members residing in various parts of the country, it will be desirable, so soon as the funds at the disposal of the Society permit, to establish a regular series of Council meetings for which a liberal mileage payment shall be made to non-resident members. It is suggested that at the outset possibly three such meetings during the year held in the months of January, May and September might be advantageous.

The following is a statement in regard to the members of the Society who have, so far as information has been received, enlisted for overseas service:—

Hon. Member	1
Members	34
Associate Members	144
Associate	1
Juniors	85
Students	89
In all	354

Of these there have been killed in action or died of wounds:--

Members	2
Associate Members	4
Juniors	5
Student	1
In all	12

The special funds for which subscriptions have been received from the members are as follows:—

Fund in aid of families of members who have enlisted for active service in the army, total..	$2,093.00
There has been paid out on account of this fund..	132.40
Canadian Engineers' Hospital and Medical Comforts Fund, total	703.45
There has been paid out on account of this fund..	450.55

The proposed excursion to the Pacific Coast, in connection with which free haulage of the Society's train had been generously provided for by the Grand Trunk, Transcontinental, Grand Trunk Pacific and Canadian Pacific Railways, had to be abandoned on account of the very small number of members (nine in all) who said that they would avail themselves of the privileges extended to them.

As indicated on a previous page of this report, there are now ten Branches of the Society, the last to be formed being that at Regina, at present under the Chairmanship of Mr. O. W. Smith.

The first Provincial Division to be formed under By-Law 54 was organized in Vancouver, for British Columbia, in July last and duly authorized by the Council at its meeting on July 20th. The names of the officers of this Division have not yet been reported.

Early in the year an effort was made to have this Society placed upon the list of educational institutions from which, under the City Charter, the civic tax is not exigible. The matter is again being taken up, it is hoped with some promise of success.

On the request of some of the members interested, the Council has memorialized the Dominion Government asking for the appointment of a Commission to revise the Patent Act.

An effort will be made during the approaching session of the Dominion Parliament to obtain an Act defining the term Civil Engineer.

Some consideration has been given during the year to publicity matters affecting the profession of civil engineering. A circular

is about to be issued with a view to instructing municipalities as to the advisability of employing only corporate members of the Society. It is also proposed to request corporate members when advertising for assistants to require that candidates shall be members of the Society.

A Special Committee, appointed by the Council, has under consideration the best means of securing the appointment of engineers on Civic Boards, and commends the matter to the membership in general as one which is deserving of their active support.

The case of a member having an office in Vancouver, against whom charges of unprofessional conduct were made by other resident members in Vancouver, was investigated by the Council. The member was requested to withdraw his statements, in a satisfactory manner, or resign. The terms of his apology not being found acceptable, the member's resignation was accepted.

Alleged unprofessional conduct by another member of this Society is at the present time under investigation in terms of the Society's By-Law 19 and Code of Ethics.

During the past summer representations were made to the Council and Board of Commissioners of the City of Montreal as to the advisability of obtaining a report from an independent Board of Engineers, upon certain proposed expenditures in connection with the aqueduct enlargement. This action of the Council of the Society has received the support of the Montreal Board of Trade, but it is regretted that the Board of Commissioners did not meet the representations in the spirit that actuated the Council of the Society.

The Council has memorialized the Dominion Government in connection with the appointment of foreign engineers on Government commissions, and has urged that inasmuch as, in some recent appointments noted, there should have been no difficulty in obtaining the services of eminently qualified Canadian engineers, it was not in the interests of the country that such appointments should be made.

The Society has been represented by delegates, specially named by the Council, at the following congresses and meetings during the year:—The International Engineering Congress, San Francisco; the Western Canada Irrigation Association, Bassano; the Annual Meeting of the American Institute of Mining Engineers, New York.

F. C. GAMBLE, President.
C. H. McLEOD, Secretary.

December 30th, 1915.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

MEMBERS OF COMMITTEE.

F. P. Shearwood, S. P. Brown,
A. Surveyer, R. J. Durley,
J. M. R. Fairbairn, Chairman.

In view of the existing financial conditions, but few books have been bought during the current year.

The following are the works which, on special request, have been added to the library by purchase:—

"Engineering Index for the Thirty-First Year."

"Transactions of the National Conference on City Planning."

"Twenty-Sixth Annual Report on the Statistics of Railways for 1913."

Presentations have been made as follows:—

By Members:

By R. Armour, M.Can.Soc.C.E.

"Eclectic Engineering Magazine," Vols. X.-XXVII.

By A. H. Blanchard, M.Can.Soc.C.E.

"Annual Report of the New York Department of Efficiency and Economy concerning matters relating to the Construction and Maintenance of Public Highways."

By J. B. Challies, M.Can.Soc.C.E.

"Water Powers of British Columbia," by G. R. G. Conway, M.Can.Soc.C.E.

"Water Powers of the Prairie Provinces," by P. H. Mitchell, A.M.Can.Soc.C.E.

"Water Powers of Ontario," by H. G. Acres.

"Water Powers of Quebec," by F. T. Kaelin, A.M.Can. Soc.C.E.

"Water Powers of the Maritime Provinces," by K. H. Smith, A.M.Can.Soc.C.E.

By F. H. Fay, M.Can.Soc.C.E.

"Report of Watuppa Ponds and Quequechan River Commission, City of Fall River."

By the author, C. E. Fowler, M.Can.Soc.C.E.

"The San Francisco-Oakland Cantilever Bridge."

By Association des Anciens Elèves de l'Ecole Polytechnique.

"Revue Trimestrielle Canadienne."

By W. R. Goodwin, A.M.Can.Soc.C.E.

"Excavating Machinery," by A. B. McDanniell.

By W. R. Pilsworth, M.Can.Soc.C.E.

"The Influence of Sea Power upon History, 1660-1783," by Capt. A. T. Mahan.

By non-Members:

By Lawrence J. Burpee, International Joint Commission, Ottawa.

"Progress Report in the Pollution of Boundary Waters Investigation."

By Francis C. Smith and W. H. Smith, Publishers.

"The Engineer's Year-Book of Formulae, Rules, Tables, Data, etc., for 1915," by H. R. Kempe.

By Barclay Parsons & Klapp, Consulting Engineers.

"Report on Detroit Street Railway Traffic and Proposed Subway."

By the Geological Survey, Department of Mines, Ottawa.

"Geology of the North American Cordillera at the Forty-Ninth Parallel," by R. A. Daly.

By the Authors.

"Pennsylvania State Railroad Commission," Vol. II., by Ford, Bacon and Davis.

By G. S. Webster, Chief Engineer.

"Report on the Collection and Treatment of the Sewage of the City of Philadelphia, 1914."

By the U.S.A. Government.

"War Department Annual Reports, 1914," Vol. II. Report of the Chief of Engineers.

By Longmans, Green & Co.

"Rivington's Notes on Building Construction," Parts I. and II., edited by W. N. Twelvetrees.

By John Wiley & Sons.

"Elements of Highway Engineering," by A. H. Blanchard.

By the Department of Marine and Fisheries, Ottawa.

"Report on the Dominion Government Expedition to the Northern Waters and Arctic Archipelago of the D.G.S. 'Arctic' in 1910."

The technical magazines, transactions, etc., which have been received during the year are substantially the same as those listed in the Report for 1914. They number in all 85. Of these 67 are exchanges and 18 are paid for. 28 are marked for binding at the end of the year, and are to be placed on the library shelves.

The Committee has pleasure in calling the attention of members to the tablet, which has been placed on the wall of the entrance hall, in commemoration of Thomas Coltrin Keefer, C.M.G., the first President of the Society.

J. M. R. FAIRBAIRN,
Chairman.

December 30th, 1915.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDED 31st DECEMBER, 1915.

Receipts.		
SUBSCRIPTIONS—		
Arrears of Fees Collected....	$ 6,732.80	
Current Fees Collected.....	12,437.67	
Advance Fees Collected.....	139.16	
Entrance Fees Collected.....	2,233.05	
		$21,542.68
INTEREST—		
Savings Bank Account	$ 12.91	
Overdue Fees	437.08	
		449.99
SALES OF TRANSACTIONS AND PERIODICALS		48.70
DIVIDENDS—		
Can. Per. & West. Can. Mtg. Corp. stock	$ 18.00	
Montreal Light, Heat, & Power Co. stock	20.00	
		38.00
Forward		$22,079.37

Expenditure.	
INTEREST—On Mortgage to 31st Dec., 1915	$ 1,200.00
Printing and Stationery, including Transactions	5,969.79
Books, Magazines and Library Expenses	98.24
Postage, Post Cards and Telegrams	1,887.38
Salaries of Secretary and Office Staff	3,768.50
Caretakers' Wages	1,140.00
Taxes	1,086.76
Water Rates	194.00
Expenses—Annual Meeting	86.00
Expenses—Ordinary Meetings	225.85
Coal and Wood	401.99
Electric Light and Power.....	178.72
Gas	29.10
Repairs and House Supplies.....	113.89
Insurance	28.00
Telephone—Rent and Tolls	141.55
Cabs, Cartage, etc.	3.60
Forward	$16,553.37

CONTINUATION OF
STATEMENT OF REVENUE AND EXPENDITURE FOR THE YEAR ENDED 31st DECEMBER, 1915.

Receipts.

Carried forward	$22,079.37

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

Montreal, 7th January, 1916.

	$22,079.37

Expenditure.

Carried forward		$16,553.37
Sundries		149.75
Auditors		150.00
Bank Commission		16.52
Legal Expenses, including Collection of Arrears.....		493.15
Examinations—less Receipts		37.60
Students' Prizes		100.00
Gzowski Medal		7.90
REBATES OF FEES TO BRANCH SOCIETIES—		
Toronto	$ 440.50	
Quebec	235.50	
Winnipeg	322.00	
Ottawa	581.25	
Vancouver	299.50	
Kingston	34.50	
Victoria	146.50	
Calgary	99.00	
Regina	35.00	
Edmonton	72.50	
		$ 2,266.25
TOTAL EXPENDITURE ON REVENUE ACCOUNT		$19,774.54
BALANCE—Being excess of Receipts over Expenditure for year ending 31st December, 1915		2,304.83
		$22,079.37

CANADIAN SOCIETY OF CIVIL ENGINEERS.

STATEMENT OF ASSETS AND LIABILITIES AS AT 31st DECEMBER, 1915.

Assets.

PROPERTY ACCOUNT		$ 89,041.64
FURNITURE—		
Balance at 31st December, 1914	$3,065.30	
LESS 10% written off for Depreciation	306.53	
		$ 2,758.77
BOOKS—Estimated value		6,250.00
ARREARS OF FEES—Estimated value		5,000.00
CANADA PERMANENT & WESTERN CANADA MORTGAGE CORPORATION—Stock		180.00
MONTREAL LIGHT, HEAT & POWER CO.—Stock		120.50
GOLD MEDAL		45.00
LOAN TO OTTAWA BRANCH	$ 300.00	
LESS Repaid	100.00	
		200.00
CASH ON HAND AND IN BANK		2,694.17
PETTY CASH ON HAND		142.69
Forward		$106,432.77

Liabilities.

PRIZE FUND ACCOUNT		$ 468.77
ROYAL INSTITUTION FOR THE ADVANCEMENT OF LEARNING—		
Mortgage on Mansfield St. Property at 6%	$20,000.00	
Interest accrued thereon to date	200.00	
		$ 20,200.00
ACCOUNTS PAYABLE		2,143.96
SUNDRY REBATES DUE TO BRANCHES		755.50
Forward		$ 23,568.23

CONTINUATION OF
STATEMENT OF ASSETS AND LIABILITIES AS AT 31st DECEMBER, 1915.

Assets.

Carried forward	$106,432.77
	$106,432.77

Montreal, 7th January, 1916.

Liabilities.

Carried forward ..		$ 23,568.23
SURPLUS—		
Balance at 31st December, 1914 ...	$80,766.24	
Add—Receipts on Revenue Account. $22,079.37		
Less Expenditure on Revenue Account. 19,774.54		
	$ 2,304.83	
	$83,071.07	
Estimated value of Books added to Library	100.00	
	$83,171.07	
LESS—Written off for Depreciation on Furniture	306.53	
		$ 82,864.54
		$106,432.77

Verified, RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A.,
Auditors.

Obituaries

FLEMING, SIR SANDFORD, K.C.M.G., Hon. M.Can.Soc.C.E., was born at Kirkcaldy, Scotland, in 1827. He came to Canada at the age of 18 and began his engineering work on the Northern Railway, one of the pioneer lines of Ontario, running northward from Toronto into unsettled regions, and since absorbed into the Grand Trunk System.

In 1863 he was chosen by the people of the Red River Settlement, now part of Manitoba, to go to England in order to urge upon the Imperial authorities the necessity of establishing railway communication between the eastern and western portions of Canada. Shortly after this, he was appointed by the Governments of Nova Scotia, New Brunswick and United Canada in conjunction with the British Government to find a route for the Intercolonial Railway from Halifax to Quebec. Sir Sandford was chief engineer of this railway during its construction. In 1871 he was appointed engineer-in-chief to carry out the Pacific Railway surveys. In 1872 he conducted the expedition, the results of which are embodied in Principal Grant's book "From Ocean to Ocean." During this time he also carried out the first survey of a railway across the island of Newfoundland, the outcome of which is the road there built and operated by the Reid Company. Sir Sandford continued his work in connection with the Canadian Pacific Railway until 1880, when owing to political exigencies he retired, having witnessed its progress until 2,000 miles of railway were under construction.

One of the most interesting achievements credited to Sir Sandford was the adoption by the railroads of this country of the standard English or Greenwich time. He was unquestionably the initiator and a principal agent in the movement for reform in time reckoning.

Having realized as engineer of the Pacific Railway, the advantages of a Pacific cable, Sir Sandford submitted to the Government a plan for such a project in 1879. This was the beginning of an agitation which he led with noble persistence for 23 years, until at last his efforts were crowned with success.

His continued activity in behalf of movements for a closer unity of the Empire, his writings and speeches in various branches

of science and literature, and his work as chancellor of Queen's University, Kingston, since 1880, gave him a life of constant usefulness in his old age. Knighthood was bestowed upon him in 1897. He was the recipient of many scholastic degrees in Great Britain, Canada and in the United States, and was elected to prominent offices in societies and organizations of the highest scientific standing in many parts of the world.

He died at Halifax on July 22nd, 1915.

KEEFER, THOMAS COLTRIN, C.M.G., LL.D., Hon. M.Can.Soc. C.E., was born at Thorold, Ont., in 1821. Mr. Keefer was educated at Upper Canada College. His first engineering work was on the Erie Canal. Later, he became associated with the Welland Canal construction, and in 1845 was made chief engineer of improvement works on the Ottawa River. Many of his early designs are still in evidence among the lumber industries of that river. In 1849, one of his most important publications entitled "The Philosophy of Railways" appeared. This book greatly influenced the governmental policy regarding the construction of railways in Canada. In 1850, he entered the service of the government to make a survey of the rapids of the St. Lawrence, with a view to the improvement of its navigation by the exploration of easier and safer routes, and also to the construction of a canal or railway between the St. Lawrence and the Upper St. John waters of Lake Temiscouata. In the same year he won Lord Elgin's prize by virtue of his book entitled "The Influence of the Canals of Canada on Her Agriculture." He assisted in the preparation of reports on the trade of British North America, and his knowledge and grasp of the commercial situation were such as to be very instrumental later in the drafting of the Reciprocity Treaty of 1884.

Mr. Keefer was appointed Commissioner for Canada to the First International Exposition in London in 1851. He again visited London in the same capacity in 1862. In 1878, he was appointed Executive Commissioner at the Paris Exposition, where he served on the International Jury of Engineering and Architecture. He was at this time made a Companion of the Order of St. Michael and St. George by Her Majesty, the late Queen Victoria, and was also elected an Officer in the Legion of Honour (France).

After his investigation of the St. Lawrence for the Government, Mr. Keefer engaged in preliminary surveys for the Grand Trunk Railway for the line between Montreal and Toronto. He also prepared a report and plans for bridging the St. Lawrence at Point St. Charles, and from his report and designs the Victoria

Bridge was built. He designed and built Montreal's first aqueduct, and in 1874-5 as chief engineer of the Ottawa Waterworks Commission, he laid out and constructed the Ottawa system. He was afterwards for a number of years engineer to the Montreal Harbour Commission. Mr. Keefer still continued to take the keenest interest in railway development, and it was largely owing to his efforts that the change was effected from narrow gauge track to the present standard gauge on Canadian Railways.

Of some of his many attainments in the more mature years of his life, those meriting special mention are his appointments as chairman of the Royal Commission on Ice Floods, and as member of the International Deep Waterways Commission. He was Fellow of the Royal Society of Canada. Mr. Keefer was associated with many scientific societies and clubs. He served as Vice-President for two periods in the American Society of Civil Engineers, and in 1888 was appointed President of that body. He was also a member of the Institution of Civil Engineers of England. His association with the Canadian Society of Civil Engineers is very well known. He was one of its founders and was twice its President. He was made an Hon. Member in 1903.

Mr. Keefer was one of Canada's Grand Old Men. As a man and as an engineer he has won an esteem that time will take long to obliterate.

He died at the Manor House, Rockliffe, Ottawa, on 7th January, 1915.

BELCHER, JOHN E., M.Can.Soc.C.E. was born in Cork, Ireland, in 1834. He was educated at Queen's University, Cork, and was afterwards articled with his father, S. R. Belcher, Architect. He was appointed assistant to Sir John Benson, Engineer of the Cork Harbour Board. Later Mr. Belcher was engineer on the improvement and completion of the work on the River Blackwater. In 1860, he was engaged on important engineering works in Liverpool. In 1869 Mr. Belcher came to Canada, and was for a number of years town and county engineer of Peterborough. He held the latter position for forty years, and may be said to have built every bridge in the county. As an architect, he designed nearly every large and public building in Peterborough. He became associated with the Canadian Society of Civil Engineers during the first year of its formation. He was also a member of the Ontario Association of Architects, and was at one time its President.

He died in Peterborough on August 20th, 1915.

FORREST, HORATIO F., M.Can.Soc.C.E., was born at Montreal in 1839. Mr. Forrest was educated in the Military College at Quebec, and engaged in Civil Engineering on the Intercolonial Railway. Later he identified himself with the Canadian Pacific Railway, and in 1873 assisted in the location of the line from Kenora to Winnipeg. He was afterwards appointed government inspector of railways, which position he held for a number of years. He then entered the employ of the Canadian Northern Railway as District Engineer, which position he resigned two years ago on account of ill-health.

He died in Winnipeg in January, 1915.

GRUNDY, GEORGE GEOFFREY, M.Can.Soc.C.E., was born at Brecon, Wales, 12th June, 1877, and was educated at Christ College, Brecon. For four years Mr. Grundy was draughtsman on the Quebec Central Railway, Sherbrooke. In 1898, he was appointed resident engineer on construction Crow's Nest Branch Canadian Pacific Railway. From 1898 to 1900, he was resident engineer with Mackenzie, Mann & Co. For eight years he occupied the position of superintendent and engineer of the Temiscouata Railway, Riviere du Loup, Que., and from 1909 until his death, he was secretary and general manager of the same railway.

He died on June 9th, 1915.

JANIN, GEORGE A. F. R. (Major), M.Can.Soc.C.E., was born at Poitiers, France, 23rd December, 1853. He was educated at Lycee Imperial University, Poitiers, and was afterwards for three years in military service. For twenty years, 1873-93, he was subchief of section Government staff of Engineers, France. After coming to Canada, Mr. Janin engaged in private practice at Montreal. In 1899, he was appointed consulting engineer, Provincial Board of Health, and since 1900 had been chief engineer and superintendent Montreal Waterworks.

After the outbreak of the war, Major Janin raised a company of engineers, many of whom were reservists in the employ of the City of Montreal. He was granted an indefinite leave of absence by the City, and went to France with his Company. After being in the fighting line for some time, Major Janin left for England on account of illness. He was drowned in the steamer Anglia which was sunk by a mine in the English Channel.

JOHNSON, LACEY R., M.Can.Soc.C.E., was born at Abington, Eng., 22nd June, 1855. He was educated at Abington Grammar

School, and later apprenticed at the Great Western Railway works, Swindon, Eng. For two years Mr. Johnson was associated with the Royal Carriage Department, Woolwich Arsenal, and later was manager of the G. Davis & Sons Engineering works, London. Before coming to Canada, he was for three years with the Scindi Punjaub & Delhi Railway Co., India. In Canada he was employed in various engineering capacities in the Grand Trunk and the Canadian Pacific Railways. From the commencement of the Transpacific service his jurisdiction was extended over the engineering department of ocean liners, during which time he spent three winters in Hong Konk, China, superintending alterations and repairs to the company's vessels. In 1901, on the purchase of the Canadian Pacific Navigation Company by the C.P.R. he was appointed Superintending Engineer of the combined fleets. From 1901 to 1912, Mr. Johnson was Assistant Superintendent of Motive Power C.P.R., Montreal, and from 1912 to 1915, General Superintendent Angus Shops District, C.P.R. He was in command as Lieut.-Colonel of the Montreal Heavy Brigade of Artillery.

He died in Montreal on April 17th, 1915.

LEOFRED, F. X. A., M.Can.Soc.C.E., was born at St. Anselme, P.Q., 16th September, 1862. He was educated at Ecole Polytechnique and McGill University, Montreal. In 1890, Mr. Leofred became a Land Surveyor, and was a member of the Board of Directors Quebec Land Surveyors from 1909 until his death. He practiced as a mining engineer in Quebec and Montreal for some years, and afterwards went to Levis, Que., where he was engaged in private practice, devoting most of his time to various waterworks problems.

He died at Charny, Que., 8th February, 1915.

RIELLE, JOSEPH, M.Can.Soc.C.E., Q.L.S., was born at Laprairie, Que., 6th October, 1833. After serving as pupil in the office of Ostel and Perrault, Mr. Rielle was appointed engineer for the Harbour Commissioners of Montreal in the early sixties of last century. While in this office he made extensive observations on the flow of the St. Lawrence in order to determine its high water mark and the boundaries of riprarian proprietors on the Island of Montreal. He was closely connected with the early developments of railways in Montreal, and was at one time Vice-President of the Pontiac Pacific Junction Railway. For over twenty years he was secretary and inspector for the Turnpike Trust Company, which controlled most of the roads about Montreal. Mr. Rielle's achievements as a Land

Surveyor will be best remembered. He had a profound knowledge of the laws of the Province of Quebec with reference to lands and their measurement, and his advice was sought by many professional and business men in Montreal. He also made a very thorough study of the old French measures which are still in force in the Province of Quebec, and worked out well-known tables showing their relations with English standards.

As a professional man, Mr. Rielle set a high standard of earnest, hard work and personal integrity.

He died at his home in Montreal on 9th May, 1915.

ROY, ADOLPHE V. (Major), M.Can.Soc.C.E., was born at Montreal, 7th December, 1868. He was educated at Ecole Nationale des Ponts et Chaussees and Ecole Centrale des Arts and Manufactures, Paris. Major Roy was appointed engineer and superintendent of Forests for Quebec Province at the World's Fair, Chicago. He practiced as a mining engineer in Tunis, North Africa, and in Alaska. Later he was in private practice in Montreal. He was a member of the Societe Civils des Ingenieurs de France, and of many other well known societies and clubs.

Major Roy went to the war with the 22nd French Canadian Regiment commanded by Col. Gaudet. He was killed in action in October, 1915. He has been described as "one of the finest soldiers that ever faced a foe."

COWAN, REGINALD P. (Lieut.), A.M.Can.Soc.C.E., was born at Dalston, England, 21st August, 1884. He graduated in Mining at McGill University and at the University of Freiburg. Mr. Cowan spent two years prospecting in Northern Ontario. In 1910 he became associated as engineer with the Atlas Construction Company, and in 1912 was appointed Vice-President of the Company. In 1914 he resigned from this position to go to Australia. While in England en route for Australia, war broke out, and he enlisted as a private in the Sixth Border Regiment. He was later granted a commission in the same battalion. In 1915, he was made regimental signalling officer. His regiment was sent to Gallipoli, where he took part in several heavy engagements and experienced great hardships from lack of water. He was taken ill and died August 16th, 1915, on board ship, before reaching Italy.

DELEPINE, HELENNS G. S. (Lieut.), A.M.Can.Soc.C.E., was born in London, 21st October, 1888. He was educated in Geneva and at the Victoria University of Manchester, from which latter

place he graduated with honours. Mr. Delepine came to Canada in 1910, and was for a time a demonstrator in engineering at McGill University. From 1911-1913, he was assistant engineer with Messrs. Waddell & Harrington, of Kansas City. He returned to Manchester in 1913, having been appointed junior instructor in Drawing and Demonstrator in the engineering department of Victoria University. While in this capacity he obtained the degree of M.Sc. In 1914, he became assistant engineer in the airship department of Messrs. Vickers at Barrow-in-Furness. He volunteered for active service later, and received a commission as Second Lieutenant in the Duke of Cornwall's Light Infantry. In January, 1915, he was sent to Northern France, where he was killed in action on 16th April, 1915.

ELMSLEY, SHERWOOD, A.M.Can.Soc.C.E., was born at Leamington, England, 5th May, 1873. He was educated at the Royal Indian Engineering College, Cooper's Hill, England. For several years Mr. Elmsley was on draughting and location work for the Canadian Pacific Railway, and was also resident engineer on location and maintenance. In 1905-6, he was location engineer for the Alaska Central Railway, the Cascade Valley River Railway, and the T. & N. O. Ry. For several years Mr. Elmsley was in private practice engaged in prospecting, exploring, etc., and in government work.

He died in Toronto on March 17th, 1915.

GENEST, ARTHUR T., A.M.Can.Soc.C.E., P.L.S. and D.L.S., was born at Fermont, P.Q., July 10th, 1859. He was educated at St. Joseph's College, Three Rivers, Que., and had his early engineering training in Railway location and construction on the Q. M. & O. Ry. Mr. Genest was district engineer in charge of location on the Laurentian Ry., now a part of the Canadian Northern Railway; contractor's engineer on construction of the Pontiac Pacific Junction Ry., now the Ottawa and Waltham Ry.; First Assistant Engineer on the enlargement of the Lachine Canal; First Assistant Engineer Rapid Plat & Farran's Point Canal; Division Engineer Balsam Simcoe Lake Division on construction of Trent Canal; Engineer in charge, Final Estimates Cornwall Canal Enlargement. Since 1904, Mr. Genest was assistant engineer at headquarters of the projected Georgian Bay Ship Canal. He was also engaged on various surveys, including some in Northern Quebec for the Provincial Government. Mr. Genest was a member of many Scientific Societies, and was a contributor to the French

and English Press. He founded "The Clarion," the first daily newspaper published at Three Rivers, in 1884.

He died in Ottawa on 27th January, 1915.

LUTHER, C. MARTIN, A.M.Can.Soc.C.E., was born in Marash, Armenia, 1875. He graduated from the Central Turkey College and came to the United States in 1897. He took the Civil Engineering Course at Yale University, graduating in 1901, anl was then selected to go as an Instructor to the Philippines, where he remained for two years. After he returned to the United States he filled positions with the N.Y., N.H. & H.R.R., the New York Central Railway, and the American Bridge Company. He entered the service of Mackenzie, Mann & Co.. Limited, in 1908, and had charge of the design of concrete and masonry structures for their work in Eastern Canada until his death on 8th December, 1915.

MICHAUD, JOSEPH LOUIS, A.M.Can.Soc.C.E., P.L.S., and D.L.S., was born in Rimouski in 1851. After holding various engineering positions of responsibility, Mr. Michaud was appointed District Engineer of the Department of Public Works in the District of Montreal in 1896, which position he held until January, 1915, when he was appointed Consulting Engineer for the Department of Public Works.

He died in Montreal on 14th November, 1915.

MORRISON, THOMAS E. (Capt.), A.M.Can.Soc.C.E., was born in Quebec on 8th July, 1887. He was a graduate in Civil Engineering of the Royal Military College, Kingston. His first engineering work was as Asst. Div. Officer No. 1 Halifax Fortress. In 1909 he was appointed Division Officer. Mr. Morrison was Asst. to Camp Engineer, Niagara Camp, and was later appointed Division Officer, Royal Canadian Engineers, Toronto.

He left Canada with the first contingent as a Captain in the Canadian Engineers Corps, and was killed in action on 15th June, 1915.

NEWLANDS, JOHN ERIC, A.M.Can.Soc.C.E., was born in Edinburgh, 12th December, 1881. He was educated at Edinburgh University, from which he graduated with degree B.Sc. in 1903. Mr. Newlands received most of his engineering experience with the Canadian Pacific Railway in various departments. In 1906, he was appointed resident engineer on the construction of a branch line of this railway out of Montreal. He was afterwards transferred to the Irrigation Department of the Company near Calgary, and had

charge as Division Engineer of the construction of over 1,000 miles of main and distributing canals. He continued in charge of this work until its completion in September, 1914, when he returned to England. While in England, he received from the Colonial Office an important administrative appointment in West Africa, and was to have entered upon his duties on 28th April, 1915.

He died in London on 26th April, 1915.

REVELL, GEORGE ERNEST, A.M.Can.Soc.C.E., was born at Woodstock, Ont., on the 4th of August, 1877. He was a B.Sc. of the University of Toronto. After graduation Mr. Revell was employed as assistant engineer on the Trent Canal Surveys, and on the works of Messrs. Ross & Holgate at Seven Islands, and at the West Kootenay Power & Light Company. In 1906 he entered the service of the British Columbia Government, later associating himself with Messrs. Green Bros. & Burden, Surveyors, Nelson, and obtained his diploma as a B.C. Land Surveyor. When war broke out he went to Vancouver and was one of the first to enlist in the Engineers. He declined a commission, preferring the work of a sapper. In this capacity he with several others placed a large mine beneath the front line of German trenches. While waiting for it to explode he and seven of his companions were killed by a German 12-inch shell on 15th June, 1915. He was buried with his companions in the crater of the shell hole where he fell.

VAN HORNE (SIR) WILLIAM, K.C.M.G., A.Can.Soc.C.E., was born in 1843. Sir William was one of the most prominent of Canadian railroad men, and was in a great measure responsible for the speedy construction and successful development of the Canadian Pacific Railway, of which he became General Manager in 1882. In 1888, he was made President of the Company, which position he occupied for eleven years, resigning to become Chairman of the Board of Directors, in which capacity he served until 1910. He remained a director of the Company until his death. Sir William received his early training with the Illinois Central and the Michigan Central Railways. In 1874 he was appointed General Manager of the Southern Minnesota Railway, and was later its President. He was afterwards associated with the Chicago, Milwaukee & St. Paul Railway as General Superintendent, which position he resigned to become General Manager of the Canadian Pacific Railway.

Sir William was a man of large and varied interests, and was connected in a high official capacity with many great enterprises.

Among these were the Cuba Railway Company, of which he was President. He was also President of the Laurentide Paper Company, Canadian Salt Company, and the Demerara Electric Company. He was Vice-President of the Dominion Iron & Steel Company, the St. Paul & S.S.M. Railway, Dominion Coal Company, Mexican Light & Power Company, and many others.

In spite of his many business interests, Sir William devoted much time to art. His collection of paintings is one of the finest in Canada, and he was himself an artist of no mean order.

He died at Montreal on September 11th, 1915.

BELL-IRVING, DUNCAN PETER (Lieut.), Junior Can.Soc.C.E., was born at Bushey, Eng., 3rd January, 1888. After graduating from the Royal Military College, Kingston, Mr. Bell-Irving was on location work for the Canadian Northern Railway. He was afterwards engaged by the contractors in field tunnel work for the Canadian Pacific Railway. He obtained his diploma as a British Columbia Land Surveyor, and was engaged in Government survey work in the west until the outbreak of the war. He obtained a commission in the Second Field Company, Canadian Engineers, with the First Canadian Contingent, and was killed at Le Tougnet, Belgium, on 25th February, 1915.

CAMPBELL, THOMAS CALLENDER (Lieut.), Junior Can.Soc.C.E., was born in India, 22nd October, 1887. He was educated at Queen's College, Galway, and after graduation came to Canada in 1911. He commenced work in the Engineering Department of the Canadian Pacific Railway, with headquarters at Montreal. He was afterwards employed on the preliminary survey work of the Mount Royal Tunnel in Montreal. In 1912 Mr. Campbell came to Ottawa as a member of the staff of Messrs. Hazen & Whipple, who at that time were designing a Water Purification Plant for the City of Ottawa. On the completion of this work he became a member of the staff of the City Waterworks Department in Ottawa. In 1913 Mr. Campbell became Chief Assistant to the John verMehr Engineering Company, of Toronto, and was engaged on the design and construction of the new Water Purification Plant for the City of Toronto.

In September, 1914, Mr. Campbell left Toronto for England where he joined one of the University Training Corps. From this he received a Commission in the Royal Engineers, and after being stationed at several Military Camps in England, landed at the Dardanelles in July, 1915. The first day he was in the trenches

he was slightly wounded but soon recovered. Early in October he was, however, severely wounded and died on board ship on October 8th, 1915, while being conveyed back to England.

DUGGAN, HERRICK STEVENSON (Lieut.), Junior Can.Soc.C.E., was born in Montreal, March 9th, 1891. After preliminary training at St. Albans' School, Brockville, he matriculated in Arts, McGill University in 1906. He spent a year in Europe, principally at a Swiss school, and entered the Arts course of McGill University in 1907. In 1908, he entered the Mechanical Engineering Course, and graduated in Mechanical Engineering, 1912. After graduating he joined the Engineering Staff of the Dominion Bridge Company, and was with that Company and the St. Lawrence Bridge Company until October, 1913, when he went to Germany to enter the employ of the Machinen Fabrik, Augsburg-Nuremburg at Mainz.

He returned to the Dominion Bridge Company in July, 1914, and was employed in the erection of various works, principally on the Canadian Northern Railway and on bridges in the City of Quebec, until October, 1914, when he went to England to represent this Company in London.

Mr. Duggan was interested in all kinds of sports, but was best known in connection with yachting, where he had attained a reputation both as a designer and racing skipper—having won a number of races with his own designs. He won a good many important races on Sydney Harbour, on Lake St. Louis and an International Cup at Alexandria Bay in 1913.

Before leaving for England he had several times attempted to enlist in the Princess Patricias, but had been rejected on account of a slightly strained heart. After a short time in England he was offered a Commission in the Royal Engineers, and as he spoke French and German fluently, the medical examination was possibly somewhat relaxed. He completed his military training in an exceptionally short time and was sent to France with the 70th Field Company early in May, 1915. On the night of the 18th October he was sent with a company of Sappers to consolidate a trench then being attacked on the north of the Hulloch Quarries. The bombing party lost its Officers and were driven back on the Sappers, when Lieut. Duggan took charge of the attack and carried it out successfully. He received a slight wound in this attack but refused to retire and was given charge of the party. Later in the same night, one of the Infantry Officers who had gone out to bring in some advanced Bombers, did not return, and Lieut. Duggan

went out to bring him back. He was severely wounded in this attempt and was taken to Bethune, where he died two days later, October 21st, 1915.

HELLIWELL, JOSEPH GRANT (Capt.), Junior Can.Soc.C.E., was born in Toronto 26th November, 1888. He graduated from the University of Toronto with the degree of B.A.Sc., in 1910. After graduation he was for a time with the Toronto Branch of the Trussed Concrete Steel Co. He left this company to take a position on the engineering staff of the City of Toronto. He was later employed by the Canadian Bridge Company at Walkerville, Ont., where he remained for almost three years until the outbreak of the war in August, 1914.

While at College he was connected with the Engineers' Corps, and on removing to Windsor joined the Essex Fusileers. While living in Windsor, he took a course of military instruction and was gazetted Captain in 1913. Captain Helliwell was one of the first officers of his district to volunteer for active service.

He was killed in action near Givenchy, France, on 15th June, 1915.

ROSHER, JOHN HENRY, Junior Can.Soc.C.E., was born at London, Eng., 12th June, 1890. He was educated in England and after coming to Canada was employed by the Canadian Pacific Railway from 1910 to 1914 successively as rodman, leveller, transitman and acting Assistant Engineer on the Irrigation project near Calgary.

Mr. Rosher enlisted with the Princess Patricias in August, 1914, and left with the First Contingent. He was killed in action on 20th March, 1915.

DOMBROWSKI, PHILIPPE, S.Can.Soc.C.E., was born at Quebec, 3rd August, 1890. He was educated at the Ecole Polytechnique, Montreal.

He was accidentally drowned at Quebec in 1915.

FYSHE, FRANCIS (Lieut.), S.Can.Soc.C.E., was born at Halifax, 7th December, 1894. He graduated from the Royal Military College in June, 1914. Lieut. Fyshe joined Col. Creelman's Battery shortly after war was declared.

He was killed in action on 27th November, 1915.

Discussion on the Report of Council, the Report of the Library and House Committee and the Financial Statement.

The Report of Council was, on motion by Prof. W. Muir Edwards, seconded by Mr. G. A. Mountain, received. After discussion, Mr. Wm. McNab moved, seconded by Mr. G. A. Mountain, that the Report be adopted. Carried.

The Report of the Library Committee was, on motion by Mr. J. M. R. Fairbairn, seconded by Mr. R. M. Hannaford, received and adopted.

The Treasurer's statement, on motion by Mr. E. Marceau, seconded by Mr. C. H. Keefer, was received.

Mr. E. W. Oliver moved, seconded by Mr. W. J. Francis, "That in view of the Treasurer's Report and the Report of the Finance Committee being so interlaced the two be considered as one." Carried.

Mr. R. A. Ross, as Chairman of the Finance Committee, presented the following Report of the Finance Committee:—

January 10th, 1916.

Report of the Finance Committee.

After a detailed study of the financial condition of the Society, your Finance Committee, consisting of the following:—

H. H. Vaughan,
G. H. Duggan,
C. N. Monsarrat,
E. Marceau,
R. A. Ross,

desires to call attention to the serious position in which we are placed on account of the existing state of war, with consequent absence of members at the front and the falling off of new membership because of conditions in engineering generally throughout the country. The result being a serious reduction in receipts for the next year and probably the following years.

In order to present this matter properly, your Committee has condensed in the table herewith the Treasurer's Reports of the Society covering receipts and expenditures, beginning with the year 1907 up to and including the year 1915.

In order to be able to suggest a budget to govern expenditure for 1916, careful estimates have been made of the probable membership and revenues for that year, and with the assistance of the Library and House Committee, the Committee on Papers and Meetings, the Committee on Publications, and the Secretary, a budget of expenditure for 1916 is submitted for your consideration, attention being called to the following points:—

1st. ARREARS.—During the year 1915 a special effort resulted in the collection of arrears to the extent of $6,733.00. As this has largely cleared the back dues possible of collection, it is not anticipated that more than $2,000.00 can be collected during 1916.

2nd. CURRENT FEES.—Due very largely to the absence at the front of over 340 members, payment of whose fees are excused there will be an increased shrinkage in this item during 1916, though to a smaller degree than in the previous year.

3rd. ENTRANCE FEES.—Owing to the existing conditions in engineering a large proportionate decrease is anticipated in this item, and is reflected in the budget for 1916.

4th. TOTAL.—The results of the above are that whereas the revenue for 1915 was $22,080.00, that for 1916, due to the above causes, is expected to be in the neighbourhood of $15,000.00, indicating a shrinkage in revenue of about $7,000.00, due to causes over which the Society has no control.

In order that the Society may be able to liquidate its yearly obligations in view of the above shrinkage, it will be necessary to do one of the following: 1st. Borrow such moneys as may be required to carry on the operations of the Society on the same scale as during the past.. 2nd. To levy an extra yearly contribution of about $2.50 per member on the average. 3rd. To dimension our garment according to the cloth we have, by a reduction in expenditures, even perhaps to the detriment of some of the activities of the Society.

The first measure of relief indicated above does not appear sound, for it must be anticipated that deficits may occur in the following years and the charging of such cumulative operating deficits to capital account would be suicidal.

With regard to the second method great difficulties would probably arise in collecting an additional yearly fee, so that we recommend your consideration of the programme outlined below for a reduction in expenditures.

In order to ascertain whether the work of the Society can be carried on under the reduced expenditures indicated, your Committee associated with itself the Committees on Library and House, Papers and Meetings and on Publications, and enlisted the services of the Secretary, so that the budget suggested in the last column of expenditure is one which has been carefully studied by those responsible therefor. The results indicate that it will be possible to keep within the anticipated revenues, or at least very close thereto, only if a vigorous policy for the acquisition of new membership be initiated.

Bearing upon the above statement we have several comments to make:—

1st. During the year of 1914, under the heading of PRINTING AND STATIONERY, a certain amount therein charged is properly attributable to the previous year's commitments.

2nd. During the year 1914 there occurs the first deficit, due largely to the printing charged to that year.

The Spending Committee, in their Report upon the Budget for 1916, call attention to the following:—

(1) Interest payments, being a fixed charge, cannot be reduced.

(2) Printing and Stationery: By a careful selection of papers for publication, reduction of size of Annual Report and reduction of advance proofs and other small items of cost, will, it is anticipated, result in a saving of about $2,000.00.

(3) Salaries and Wages: Owing to the reduction of about $750.00 made during the previous year, these can be reduced further only with difficulty, but the matter will receive careful attention when the new Council takes up its duties. In this connection, to remedy a widespread misapprehension, it may be stated that the salary of the Secretary is $1,800.00 per year.

(4) Taxes and Water: An effort made last year to have the Society freed from taxes, as being an educational body, failed; but a renewed attempt in a different direction may have better results and will be tried. The prospects, however, do not warrant a reduction in the suggested budget.

(5) General Expenses have been cut by nearly $1,000.00 as a war measure by a careful pruning of general items of expenditure too numerous to detail separately. It may be mentioned, however, that the item of postage has been increased recently by about

$1,000.00, owing to the cancellation of our franking privilege on Transactions.

(6) Branch Societies: An automatic reduction in this item of about $266.00 is anticipated, owing to a reduction of rebates due to the absence of members at the front.

SUMMING UP.—Your Committee finds, as a result of its study of expenditures, outlined above, and with the reduced paying membership and decrease in new members which is anticipated, the results for 1916 will still show an operating deficit of about $1,633.00.

The remedy recommended by your Committee for the above condition is the prosecution of a campaign of recruiting to bring our depleted ranks up to full strength as before the war. We understand that a Committee has been formed for this purpose, to which the membership at large should give their individual assistance by an active canvass of suitable candidates for membership.

Respectfully submitted,

R. A. ROSS,
Chairman, Finance Committee.

Montreal, January 10th, 1916.

RECEIPTS AND EXPENDITURES—CANADIAN SOCIETY OF CIVIL ENGINEERS.

	1907	1908	1909	1910	1911	1912	1913	1914	1915	ESTIMATED 1916
RECEIPTS										
(1) Arrears Collected.	$2,023	$2,390	$2,023	$4,031	$2,092	$2,887	$1,994	$3,298	$6,733	$2,000
(2) Current Fees ...	6,102	7,089	7,963	9,491	11,893	13,897	15,037	15,616	12,438	11,500
(3) Advance Fees ...	144	203	376	134	288	158	186	270	139	100
(4) Entrance Fees ..	1,450	2,010	2,190	2,124	2,779	4,077	4,169	2,895	2,233	1,000
(5) TOTAL	$9,719	$11,692	$12,552	$15,780	$17,052	$21,019	$21,386	$22,079	$21,543	$14,600
(6) Interest received .	86	99	211	252	187	1,393	894	315	450	300
(7) Miscellaneous Receipts	623	630	188	79	174	341	225	172	87	100
(8) TOTAL	$10,428	$12,421	$12,951	$16,111	$17,413	$22,753	$22,505	$22,566	$22,080	$15,000
EXPENDITURES										
(9) Interest Paid	——	——	——	——	——	$ 854	$ 1,695	$ 1,201	$ 1,200	$ 1,200
(10) Printing and Stationery	$3,608	$4,055	$4,902	$ 6,268	$ 3,757	6,865	6,416	10,551	5,970	4,000
(11) Salaries and Wages	3,485	4,633	4,042	3,845	4,714	5,195	4,906	5,652	4,909	5,100
(12) Taxes and Water.	224	226	244	244	247	848	1,466	1,448	1,280	1,280
(13) General Expense.	2,192	2,515	2,760	2,670	4,198	4,307	5,257	4,812	4,151	3,053
(14) Branch Societies.	——	544	374	648	1,118	2,810	2,121	2,296	2,266	2,000
(15) TOTAL	$9,509	$11,973	$12,322	$13,675	$14,034	$20,879	$21,861	$25,960	$19,776	$16,633
(16) Excess Receipts .	919	448	629	2,436	3,378	1,874	646	....	2,304	——
(17) Excess Expenditures	——	——	——	——	——	——	——	3,394	——	1,633

Mr. Ross explained the various items of the Report at length.

In the discussion of this report, Mr. W. J. Francis placed before the meeting a comparative statement as to the income and expenditure in this Society and in the Engineering Societies of the United States. The following is an abstract of the statement:—

Comparison of Income and Expenditure of the Canadian Society of Civil Engineers with *average* expenditure of the four National Societies of the United States of America for the year 1915.

Items	American Societies	Canadian Societies
Membership - - - -	6,900	3,060
EXPENDITURE—		
Printing cost - - - -	$49,480	$5,970
do. per member - -	7.17	1 95
Postage - - - - -	7,988	1,887
do. per member - -	1.15	0.62
Clerical staff - - - -	29,710	3,768
do. per member - -	4.31	1.23
TOTAL DISBURSEMENTS - - -	$128,840	$19,775
do. per member - -	18.67	6.46
INCOME - - - - - -	144,045	22,079
do. per member - -	20.87	7.20

These figures show that the work of this Society has been conducted at a cost per member of just one-third that of the American Societies. For printing, this Society pays 25 per cent., for postage, 58 per cent., and for office staff 29 per cent. of the similar charges, per member, in the American Societies.

In order to obtain another point of view, Mr. Francis also placed before the meeting a statement of the income and expenditure of the American Society of Civil Engineers at a time in its

history (1903-1904) when its membership corresponded numerically with that of our own Society at the present date. The following is an extract from the table presented:—

Comparison of Income and Expenditure of the Canadian Society of Civil Engineers in 1915 with the *average* income and expenditure of the American Society of Civil Engineers during the years 1903 and 1904.

Items.	Receipts.	
	American Society.	Canadian Society.
Membership	3,063	3,060
Current Fees	$34,307.00	$12,438.00
Per Member	11.20	4.06
Advance Fees	14,960.00	139.00
Per Member	4.88	.04
Entrance Fees	7,650.00	2,233.00
Per Member	2.49	.73
Arrears	1,201.00	6,733.00
Per Member	.39	2.20
Other Receipts	9,051.00	537.00
Per Member	2.95	.17
Total Income	$67,169.00	$22,080.00
Per Member	21.93	7.21
	Expenditure.	
Clerical Staff	$12,045.00	$ 3,768.00
Per Member	3.93	1.23
Printing	15,990.00	5,970.00
Per Member	5.22	1.95
Postage	3,489.00	1,887.00
Per Member	1.15	.61
Interest	4,167.00	1,200.00
Per Member	1.36	.39
Other Expenditures	4,731.00	3,544.00
Per Member	1.54	1.15
Total Expenditure	$40,422.00	$16,369.00
Per Member	13.20	5.35

Mr. Francis dwelt at some length on a comparison of the various items exhibited by the foregoing statement. He referred especially to the fact that the table shows the income of the American Society from current fees to have been at this stage of its life $11.20 per member, while ours is now but $4.06, a ratio of nearly 3 to 1. The difference is, of course, due to the larger scale of dues paid by the American Society members. It is thus seen that we are trying to do a whole lot of work for nothing.

Many of the members present complimented the Finance Committee on the excellent work they had done under the difficult conditions which existed during the past year.

In reply to a question, the Secretary stated that notwithstanding the large amount of arrears collected during the year the total unpaid dues on January 1st still amounted to some $18,000, the shortage on collections for 1915 offsetting payments for previous years.

On motion by Mr. R. A. Ross, seconded by Mr. A. Surveyer the statement of the Finance Committee and the report of the Treasurer were adopted.

The Secretary announced that the first order of business in the afternoon would be the consideration of a resolution on Society affairs to be introduced by Mr. E. W. Oliver.

The session then adjourned.

Afternoon Session, January 25th, 1916.

The meeting reassembled at 3 p.m., Mr. F. C. Gamble, President, presiding.

Mr. E. W. Oliver opened a discussion on Society affairs and proposed a resolution in connection therewith.

A lengthy discussion followed, which was taken part in by Messrs. J. A. Jamieson, G. R. G. Conway, H. E. T. Haultain, W. Muir Edwards, H. R. Safford, C. H. Keefer, R. F. Uniacke and others.

Mr. Oliver withdrew his resolution, for the time being, and on motion by Mr. S. P. Brown, seconded by Mr. R. F. Uniacke, it was resolved—

"That a Committee be appointed from this meeting, consisting of Messrs. Oliver, Conway and Jamieson, with power to add to their number, to draft a joint resolution on the subject of possible reorganization of Society affairs to be presented to this meeting for consideration to-morrow at 3 o'clock."

REPORTS OF BRANCHES.

The President called the attention of the meeting to the reports from Branches and asked that they be accepted as read.

Report of the Victoria Branch.

To he President and Council:—

On behalf of the Victoria Branch we herewith submit our Annual Report for the year 1915.

The Annual Meeting was held on December 8th, and the following officers were elected by ballot, viz.:—

Chairman—H. W. E. Canavan.
Vice-Chairman—H. A. Elgee.
Treasurer—E. Davis.
Secretary—R. W. Macintyre.
A. E. Foreman.
E. G. Marriott.
Past Chairmen (who are ex-officio members)—F. C. Gamble and D. O. Lewis.
Auditors—H. A. Icke and R. H. Addison.

Twelve Branch Meetings were held during the year with an average attendance of 13.6.

The following papers were read before the Branch:—

(1) Obstructions in the Fraser River affecting the salmon industry—Messrs. Napier & McHugh.

(2) Canadian Northern Pacific Railway location—D. O. Lewis.

(3) Jordan River Power Development, Vancouver Island—C. A. Lee.

(4) The incidence of Precipitation and Temperature to river discharge in Western Canada—J. M. Case.

(5) Public Works in the North West Territories (Alberta and Saskatchewan)—R. W. Macintyre.

Fourteen applications were received for admission as Branch Associates, of whom thirteen were elected, and one Junior affiliated with the Branch during the year.

One Member, and five Associate Members, left the Province and one Junior resigned, whilst of our Branch Associates five removed from the city and three were suspended, making a total of fifteen.

Transfers—One Junior and One Student were transferred to the rank of Associate Members, and eight Branch Associates were elected to the Parent Society, leaving the present strength of the Branch as follows:—

Honorary Members	1
Members	23
Associate Members	33
Juniors	7
Students	1
Branch Associates	14
Total	79

which shows a decrease of two when compared with last year's total of 81.

Eleven members of the Branch have joined the Overseas Forces during the year, including 1 Member, 4 Associate Members, 3 Juniors and 3 Branch Associates, in addition to the eight who joined during 1914, making a total of 19, or about 25 per cent. of our membership. Two other members (A.M.) are now in England with the object of going to the front.

Eight receptions were held during the winter months, with a good attendance of members and ladies.

The Fourth Annual Convention of British Columbia members was held in Vancouver on December 10th, military service being responsible for a small attendance, as compared with former years.

Owing to the formation of a Provincial Division for British Columbia it was decided to incorporate the Convention proceedings with those of the Provincial Division, which is a nominal change only, i.e., that of name, as all past Conventions have been Provincial gatherings of the British Columbia members.

The proceedings of this meeting are being forwarded separately by the Secretary of the Provincial Division.

A detailed statement of Members' addresses, resignations, removals, and names of those who have joined the C.E.F. is attached.

Respectfully submitted,

H. W. E. CANAVAN, Chairman.
R. W. Macintyre, Secretary.

Moved by Mr. D. O. Lewis, seconded by Mr. W. F. Tye, that the report of the Victoria Branch be accepted. Carried.

REPORT OF THE VANCOUVER BRANCH.

The President, Council and Members,
Canadian Society of Civil Engineers,
Montreal, Canada.

Dear Sirs,—

On behalf of the Vancouver Branch we have pleasure in submitting our report for the year 1915.

The present membership of the Branch is One Hundred and Nineteen, distributed as follows:—

Members	38
Associate Members	63
Juniors	10
Students	8

Our Branch has five Members, fourteen Associate Members, two Juniors and three Students on Active Service.

Lieutenant Duncan Peter Bell-Irving, Junior Member, was killed in battle in the early part of this year.

We also regret having to record the deaths during this year of Mr. Walter Moberly, an Honorary Member of our Branch, and Mr. Harry B. Abbot, M.Can.Soc.C.E.

Thirteen meetings were held during the year, and the following papers, most of them illustrated with lantern slides, were presented:—

Jan. 7. Vancouver Joint Sewerage Scheme, by A. D. Creer, M.Can.Soc.C.E.

Jan. 21. Street Railway Track Construction, by H. J. Tippett, Jun.Can.Soc.C.E.

Feb. 4. Ancient and Modern Gas Manufacture, by Mr. R. W. Ford.

Feb. 18. Discussion, "Relation of the Engineer and the Contractor, Contracts and Specifications."

Mar. 4. The Vancouver Terminals of the C.P.R., by Mr. H. Rindal.

Mar. 18. The Kingsway Paving, by F. L. Macpherson, M.Can. Soc.C.E.

April 1. Docks and Harbours, by Mr. J. McLachlan.

April 15. Remedial Works on the Fraser River, by Messrs. Napier and McHugh.

June 3. Annual Meeting.

July 16. Meeting called to select Committee to proceed with the work of forming a Provincial Division.

Oct. 28. First Meeting of the Winter Session, addressed by the Chairman, Mr. R. F. Hayward, M.Can.Soc.C.E., on The Mexican Light & Power Co.'s Plant.

Nov. 18. Military Sketching and Reconnaissance, by Lieutenant Tweedale.

Dec. 2. Bridges and Foundations Extraordinary, by C. E. Fowler, M.Am.Soc.C.E.

At the Annual Meeting on June 3rd, the following officers were elected to hold office for the season 1915-16:—

Chairman—R. F. Hayward, M.Can.Soc.C.E.
Vice-Chairman—H. E. C. Carry, M.Can.Soc.C.E.
Executive—D. Cameron, M.Can.Soc.C.E.,
C. E. Cartwright, M.Can.Soc.C.E.,
A. G. Dalzell, M.Can.Soc.C.E.,
E. G. Matheson, M.Can.Soc.C.E.,
Secretary-Treasurer—A. K. Robertson, M.Can.Soc.C.E.
Auditors—H. P. Archibald, A.M.Can.Soc.C.E.,
B. R. Warden, M.Can.Soc.C.E.

On October 28th, F. O. Mills, A.M.Can.Soc.C.E., was appointed Assistant Secretary, as Mr. A. K. Robertson's military duties took him from the city a greater portion of his time.

The principal Engineering Magazines are kept on file in the library and reading room of the Branch, 1017 Metropolitan Building, for the use of the members.

Respectfully submitted,

R. F. Hayward, Chairman.
Alen K. Robertson, Secretary-Treasurer.

Moved by Mr. G. R. G. Conway, seconded by Mr. A. A. Dion, that the report of the Vancouver Branch be adopted as presented. Carried.

Report of the Calgary Branch.

To the President, Council and Members of the Canadian Society of Civil Engineers.

Gentlemen,—On behalf of the Calgary Branch of the Canadian Society of Civil Engineers we beg to submit the following report

of the Calgary Branch of the Canadian Society of Civil Engineers for the year 1915:—

During the past year there have been nine general business meetings of the Members of the Branch, including the Annual Meeting in December.

The Executive Committee held twelve business meetings and the Committee on Credentials and Applications held three business meetings. In addition to this there were informal meetings of certain members of the Branch to arrange for the entertainment of a party of Engineers who visited Calgary on October 4th.

Seven suppers were given by the Branch, with speakers as follows:—

Date.	Name of Speaker.	Subject.
Dec. 30, 1914.	A. H. Clarke, K.C., M.P.	"Drainage Laws."
Jan. 15, 1915.	F. L. Haszard, M.D.....	"Camp Sanitation."
Jan. 29, 1915.	George Romanes, B.Sc...	"Problems and Practice of Municipal Engineering in Calgary."
Feb. 19, 1915.	Prof. W. Muir Edwards, M.Sc.	"The Engineer and his undeveloped possibilities."
Mar. 9, 1915.	Colonel E. A. Cruickshank	"The German Theory of War."
Mar. 26, 1915.	Norman S. Rankin	"The Panama Canal and Exposition."
Apr. 9, 1915.	Wm. Murdock	"Engineering Problems in St. John, N.B."

In addition to this a luncheon was given previous to the Annual Meeting in December at the Palliser Hotel, and on October 4th, a party of Engineers returning from the International Engineering Congress at San Francisco, Cal., U.S.A., were given a drive about the city in the forenoon, a luncheon at the Palliser Hotel at noon and a supper at the Hunter Hotel at Bassano in the evening.

A. C. D. Rath and E. N. Ridley attended the Convention of the Western Canada Irrigation Association at Bassano, Alberta, on November 23rd, 24th and 25th, as delegates for the Parent Society, and P. J. Jennings and G. N. Houston attended as delegates for this Branch.

A statement of the finances of the Branch on November 30th, 1915, shows a balance of $365.95 in the Bank.

The present membership of the Branch is sixty seven, distributed as follows:—

Members	17
Associate Members	34
Juniors	4
Students	4
Associates of Branch	8
	67

Eight of our membership have enlisted for overseas service.

We regret to have to report John H. Rosher, Junior, killed in action "Somewhere in France" in March, 1915.

We feel that the Branch has advanced materially during the past year, and that it is exerting an influence in the community. The fact that the City Council gave us a grant for use in entertaining a party of Engineers who visited the city and accepted our offer to investigate and report on the technical matters referred to in Alderman Fawkes' charges regarding the Centre Street Bridge, are evidences of the official recognition which we have received.

The Annual Meeting was held December 4th, 1915, and the following officers were elected for the ensuing year:—

Chairman—William Pearce.
Secretary-Treasurer—Sam G. Porter.
Executive Committee—P. J. Jennings,
A. S. Dawson,
H. Sidenius,
H. B. Muckleston, } Ex-officio.
F. H. Peters, }
Auditors—J. S. Tempest,
S. K. Pearce.

An amendment to our By-Laws providing that the last two surviving Past-Chairmen shall be ex-officio members of the Executive Committee went into effect December 31st, 1915.

Respectfully submitted,

WM. PEARCE, Chairman.
SAM G. PORTER, Secretary-Treasurer.

Moved by Mr. W. M. Edwards, seconded by Mr. J. Duchastel, that the report of the Calgary Branch be adopted as presented. Carried.

Report of the Edmonton Branch.

The President and Members of the Canadian Society of Civil Engineers:—

Gentlemen,—The Executive of the Edmonton Branch begs to submit herewith the annual report covering the activities of the Branch for the year 1915.

The Membership of the Branch at the present time is as follows:—

Members	8
Associates	1
Associate Members	24
Juniors	7
Students	3
Branch Associates	7
Total	50

The following papers have been read before the Branch:—

"Military Engineering," by D. Donaldson.

"Standardization as Applied to City Utilitles," by A. J. Latornell.

"The Construction and Operation of Electric Street Railways," by J. H. Larmonth.

"A Mining Trip to Prince William Sound, Alaska, in the Early Stage of its Development," by W. T. Ferrier.

These papers were illustrated by lantern projections which added greatly to their interest.

The Branch also spent several evenings visiting Engineering works of interest in the city, including the following:—

The City Power Plant.
The Electric Street Railway Car Barns.
The City Telephone Exchange.

The Superintendent of each City Utility personally conducted the Engineers during the visit.

At the General Meeting for the election of Officers, which was held on May 19th, 1915, the following Officers were elected for the ensuing season:—

Chairman—A. T. Fraser.
Vice-Chairman—A. J. Latornell.
Secretary-Treasurer—L. B. Elliot.

These Officers, with the following Members, constitute the Executive Committee of our Branch:—

J. Chalmers,
J. L. Coté, M.L.A.,
C. A. Robb,
W. R. Smith.

As the Vice-Chairman, A. J. Latornell, has been absent several months, J. L. Coté was appointed to act during his absence.

The newly elected Officers were installed at the Annual Meeting, which was held on October 18th last. At this meeting the Secretary-Treasurer's and the Auditor's report for the Branch year were read and adopted.

With the opening of the season of 1915-1916 the Branch felt that it would add to the general interest to have more informal discussions on important Engineering problems of the day, particularly those affecting the West. Following this policy we had recently an interesting discussion on "Spur Track Regulations in the City of Edmonton." At the last regular meeting of the Branch we were favoured with an interesting address on the Provincial Highways by the Hon. Charles Stewart, Minister of Public Works in the Alberta Government.

Through the kindness of the President of the University of Alberta, the Branch has been allowed the privilege of having its regular meetings in the University. Further, the Branch Members have the opportunity of obtaining books from the University Library on the same basis as the Students.

The Edmonton Branch has taken a keen interest in Society affairs, particularly with reference to Western matters. We have had considerable exchange of views with the other Western Branches, in an effort to secure united action in our endeavours.

Respectfully submitted,

A. T. FRASER, Chairman.
L. B. ELLIOT, Secretary-Treasurer.

Moved by Mr. W. M. Edwards, seconded by Dr. L. A. Herdt, that the report of the Edmonton Branch be adopted as presented. Carried.

Report of the Regina Branch.

The Regina Branch of the Canadian Society is just concluding the initial year of its existence. Just about a year ago the first meeting was held, at which the establishment of this Branch was decided upon, and the Parent Society notified to this effect. Right from the start the Regina Branch endeavoured to arrive at some understanding with the "Regina Engineering Society," in order to have as close a co-operation as possible between the two societies, the local field being too small for two independent bodies with the same aims.

After several General and Executive Meetings of both Societies it was decided unanimously to hold joint meetings every first Thursday of the month, the conduct of the meeting to be vested alternately in each Society. At the date of this report there have been three meetings held jointly, one of them by the Regina Branch of the Canadian Society, at which a paper was read by the Chairman of the Branch, Mr. O. W. Smith, on the subject of "Specifications," dealing very thoroughly with the advantages and disadvantages of the various clauses in General and Special Specifications from a Contractor's point of view.

Besides this joint meeting there have been five Executive and three General Meetings held by the Regina Branch during the past year, mostly for organization purposes, considering and deciding upon By-Laws, etc. The trying period of organization being concluded, the Branch looks upon the coming year to further develop a feeling of professional fraternity amongst its members and to increase the usefulness and the prestige of the Canadian Society of Civil Engineers.

The Branch enters upon the second year of its existence with 4 Members, 18 Associate Members, 1 Junior and 2 Student Members, of which total number eight are on Active Service.

The Officers elected for the ensuing year are as follows:—

Chairman—O. W. Smith.
Vice-Chairman—L. A. Thornton.
Secretary-Treasurer—J. N. deStein.
Members of Executive Committee—J. A. McPherson, R. J. Lecky.

The Branch not having received any refund from the Parent Society, is not making a financial statement.

O. W. Smith, Chairman.
J. N. deStein, Secretary-Treasurer.

Moved by Mr. W. J. Francis, seconded by Mr. S. P. Brown, that the report of the Regina Branch be adopted as presented. Carried.

Report of the Manitoba Branch.

On behalf of the Manitoba Branch we take pleasure in submitting the following report for the year 1915:—

Officers for the season, May, 1915, to May, 1916, are as follows:—

Chairman—W. G. Chace.
Executive Committee—W. A. Duff,
E. P. Fetherstonhaugh,
Frank Lee.
Secretary-Treasurer—A. W. Smith.
Auditors—W. L. MacKenzie,
B. S. McKenzie.

Seven regular meetings of the Branch were held at which the following papers were read and discussed:—

Jan. 7, 1915. "Naval Ordnance and Gunnery," by John Sweeney.
Feb. 4, 1915. "Lethbridge Sewage Disposal Works," by A. C. D. Blanchard.
Mar. 4, 1915. "Winnipeg's Well System of Water Supply," by W. P. Brereton.
Sept. 9, 1915. "Steam Power Plants at Divisional Points on the Grand Trunk Pacific Railway," by H. Lorimer.
Oct. 14, 1915. "Something About Projectiles," by T. R. Deacon.
Nov. 4, 1915. "Righting of the Transcona Elevator," by Frank Lee.
Dec. 9, 1915. "Grade Separation in the City of Winnipeg," by W. P. Brereton.

The average attendance at these meetings was forty.

Six meetings of the Electrical Section were held at which the following papers were read and discussed:—

Jan. 18, 1915. "Automatic Lighting Plants," by Leonard Andrews.
Feb. 15, 1915. "The Community of Interests Between the Public and the Service Corporation," by J. G. Glassco.
Mar. 8, 1915. "High Tension Transmission," by T. Phillips.

Oct. 13, 1915. "Electric Signal System as a Factor in Fire Protection," by F. A. Cambridge.

Nov. 10, 1915. "Wireless Telephony," by J. M. F. Wilson.

Dec. 8, 1915. "Application of Curves, Charts and Graphs to the Analysis of Engineering Problems," by F. H. Martin.

The average attendance at these meetings was thirty-three.

Six meetings of the Mechanical Section were held at which the following papers were read and discussed:—

Jan., 1915. "Compressed Air," by E. T. Spidy.

Feb., 1915. "The Measurement of Air and Other Gases, Including a Description of the Thomas Electric Gas Meter," by Prof. W. C. Rowse.

Mar., 1915. "Gas Engines," by Prof. W. J. Gilmour.

May, 1915. "Oils, Their Manufacture and Distillation," by L. A. Warren.

Oct., 1915. "Relation Between Production and Costs," by H. L. Gantt.
(This is a paper Mr. Gantt read before the American Society of Mechanical Engineers.)

Dec., 1915. "Reinforced Concrete, Its Evolution, Advantages and Disadvantages in Construction," by M. T. Cantell.

The average attendance at these meetings was fifteen.

The present membership of the Branch is distributed as follows:—

Members	36
Associate Members	75
Associates	1
Juniors	20
Students	28
Local Associates	58
Total	218

Twenty-seven members have enlisted for Active Service and are now either at the front or in training.

The first volume of Transactions of the Branch, including papers read in 1914-15, was printed this year and distributed to the members.

A registration list of unemployed members has been started, by which it is hoped Engineers out of work may be brought in touch with those requiring their services.

The Annual Meeting of the Branch was held on December 9th, 1915, at which the following Officers were elected for the season 1916-17:—

Chairman—Frank Lee.
Executive Committee—A. H. Aldinger,
J. A. Douglas,
J. C. Holden.
Secretary-Treasurer—A. W. Smith.
Auditors—W. L. MacKenzie,
B. S. McKenzie.

The Treasurer's report presented at the Annual Meeting of the Branch showed a credit balance of $721.21.

Respectfully submitted,

W. G. CHACE, Chairman.
A. W. SMITH, Secretary-Treasurer.

Moved by Mr. B. S. McKenzie, seconded by Mr. Wm. McNab, that the report of the Manitoba Branch be adopted as presented. Carried.

REPORT OF THE OTTAWA BRANCH.

To the President and Members of the Canadian Society of Civil Engineers.

Gentlemen,—On behalf of the Managing Committee of the Ottawa Branch, we beg to submit the following report for the calendar year 1915:—

The annual meeting of the Branch was held on the 14th of October; the following officers were elected:—

Chairman—John Murphy.
Secretary-Treasurer—J. B. Challies.
Managing Committee—R. deB. Corriveau,
A. Gray,
W. S. Lawson,
A. T. Phillips,
G. G. Gale.

The Managing Committee selected the following standing committees:—

Entertainment—Alex. Gray, Chairman; G. G. Gale, J. H. McLaren.

Papers—W. S. Lawson, Chairman; A. T. Phillips, J. B. Challies.

Rooms and Library—R. deB. Corriveau, Chairman; W. F. M. Bryce, G. B. Dodge, B. E. Norrish, (Librarian).

Membership—A. B. Lambe, Chairman; J. A. Robert, E. B. Jost, G. B. Dodge, W. F. M. Bryce.

The Branch membership figures for 1913-14-15 are given hereunder:—

	1913.	1914.	1915.
Honorary Members	3	3	1
Members	51	46	51
Associate Members	116	113	124
Associates	1	1	1
Juniors	15	28	33
Students	28	16	27
Ottawa Associates	24	21	17
Total	238	228	254

As may be noted, many changes have taken place. Two of our most prominent members, Sir Sandford Fleming and T. C. Keefer, C.M.G., both Honorary Members of the Society, died during the year. We also report the death of Mr. T. C. Campbell and A. T. Genest, the former while on active service at the Dardanelles.

An analysis of the changes in our membership indicates a very satisfactory readjustment of classification, by transfers from low to higher grades. The question of transfers, especially from the Student class, is now receiving the attention of a special committee on Membership.

A large proportion, about 10 per cent., of our total membership, has enlisted for overseas service. The following is as complete a list as can be secured of all members now on active service:—

A. A. Anderson,
E. F. Brown,
F. L. Delaute,
H. H. Donnelly,
A. W. Gregory,
T. V. Anderson,
W. E. Blue,
J. L. H. Bogart,
H. W. Tate,
R. L. Junkin,

G. F. Gervan,
R. W. Guy,
J. C. Galway,
J. H. Ramsay,
R. W. Powell,
S. D. Parker,
J. C. Stewart,
A. Nowlan,
F. O. Hodgins,
C. N. D. Otty,
D. A. White,
T. C. Keefer, Jr.,
A. P. Deroche,
G. H. Ferguson,
R. S. Stronach,
J. P. McRae,
H. Brunlees,
H. A. Dupre,
A. Dale Harris,
J. H. Munro,
A. Theriault.

The Branch has been endeavouring to include the military engineers in training at the Engineering Depot at Ottawa in all its activities.

Two very important amendments have been recommended by the Managing Committee, and these have been approved by letter ballot by the membership.

The first amendment provides for the enlargement of our Managing Committee to include the past-chairman, the past-secretary and the sitting members of Council resident within our jurisdiction for one year only, following their term of office. This will undoubtedly be in the best interest of the Society as it not only furnishes the Branch with the right to the benefit of their advice and assistance, which these officers in question have always generously given, but also affords the Branch a direct, close and continuous connection with the Council of the main Society.

The second amendment affects the fiscal year of our Branch which has, from its inception, been from October to October. This arrangement, with a consequent change of officers at a time which does not coincide with the main Society's fiscal year, has made it difficult for us to make a satisfactory and complete annual report to the main Society. Acting upon a recommendation of the retiring officers, our official year has been made the calendar year.

Our Papers and Entertainment Committees have been very successful in securing a number of prominent speakers on subjects of great interest to the engineering profession and to the general public. The attendance, especially at open meetings, has been unusually large. The following is a list of the meetings held during the year 1915:—

"Town Planning and its Relation to the Engineer"—Thos. Adams.

"Grain Elevators and their Construction"—James Spelman, M.Can.Soc.C.E.

"Economic Conditions Governing Transportation in Canada"—W. Sandford Evans.

"Slow Sand Filtration of Water Supplies"—Joseph Race.

"A New Country Club"—W. T. Macoun.

"The Seizure of German Trade"—Dr. James Bonar.

"Economics of Engineering Problems"—W. Sandford Evans.

"Railroad Construction and the Public"—H. A. Powell, K.C.

"The Ethics of Engineering"—Hon. Sir George Foster.

"A Trip to the Panama Pacific International Exposition"—John Murphy, M.Can.Soc.C.E., Fel. A.I.E.E.

"Aviation"—J. A. D. McCurdy.

"Munitions"—Sir Alex. Bertram, M.Can.Soc.C.E.

"Difficult Foundations in Mexico"—S. J. Fortin, M.Can.Soc.C.E.

The Normal School auditorium, the Board room of the Commission of Conservation, and the Ottawa Public (Carnegie) Library hall, have been courteously placed at our service for open meetings by the officials in charge of them.

A small proportion only of the papers and addresses were contributed by members of the Society. It is considered desirable that men who are not engineers should often be induced to address the Branch on topics of general interest. It is, at the same time, considered equally important for the profession, that our own members should be induced to relate their experiences in connection with special engineering works on which they have been engaged, and share with their fellow members the practical knowledge which they have acquired while overcoming engineering difficulties met with in the construction of works, and, incidentally, in the handling

The Branch has not indulged in any form of "entertainment" during the year. The Entertainment Committee's efforts have been devoted to securing after-luncheon speakers and to co-operation with the Papers Committee.

We are still without permanent rooms for Branch headquarters, and, in view of the necessity for stringent economy, it is not probable we shall make any definite arrangements towards permanent quarters at present, but through the courtesy of the gentlemen above referred to, suitable meeting places have always been provided.

While it is felt that the lack of suitable headquarters for the Branch is a great drawback, special and successful efforts have

been made to keep up the interest of our members by arranging for attractive and interesting evening and mid-day meetings; the chief feature of the latter is always a short address by a prominent resident of or visitor to the Capital.

The Branch has endeavoured to effect every possible economy. Our finances are still low, but continue to improve slightly, and it is hoped that before the end of 1916 the Branch will be able, notwithstanding the present circumstances, to report an even more satisfactory financial condition.

JOHN MURPHY, Chairman.
J. B. CHALLIES, Secretary-Treasurer.

Moved by Mr. J. B. Challies, seconded by Mr. A. A. Dion, that the report of the Ottawa Branch be adopted as presented. Carried.

REPORT OF THE TORONTO BRANCH.

The interest shown by the Members of the Branch and also by the Engineering Students of the University of Toronto was exceedingly gratifying, and the Executive Committee feel that some progress has been made notwithstanding the cloud overhanging us all.

A membership campaign has been quietly carried on with some degree of success, as the following table will show:—

	1914.	1915.
Members	45	48
Associate Members	106	119
Associates	8	8
Juniors	33	36
Students	103	133
	295	344

This shows an increase of 49 members, or 17% over the previous year.

Three members, fifteen associate members and about seventy-five students have gone to serve the colours.

The Executive felt that something should be done to increase the interest in the Society, as well as to promote the welfare of the members, and with this in view, we took preliminary steps towards

establishing a working organization that would stimulate discussion and research. Standing Committees were formed covering the various branches of the profession. These Committees have presented reports, copies of which have been forwarded to the parent Society and are appended hereto. During the coming year, this organization will be perfected and we look forward for promising results.

Eight meetings were held and one trip taken during the year as follows:—

Thursday, February 25th, 1915.—Address, illustrated with motion pictures and lantern slides. Speaker, Mr. W. McNab. Subject, "Construction of the Grand Trunk Pacific Railway." Held in Chemistry and Mining Building, University of Toronto. Number present, 172. The Branch also formed a Committee at this meeting to report to the Ontario Government, at their request, on drainage of farm lands.

Thursday, March 25th, 1915.—Luncheon at Dunning's Restaurant. Speaker, Mr. T. T. Black. Subject, "The Bloor Street Viaduct." Number present 60, including delegates from the Second International Good Roads Convention.

Thursday, April 1st, 1915.—Address, illustrated with lantern slides. Speaker, Dr. John A. Amyot. Subject, "The work of the International Waterways Pollution Commission and Sewage Disposal in General." Held in Chemistry and Mining Building, University of Toronto. Number present, 60.

Thursday, April 22nd, 1915.—Address, illustrated with lantern slides. Speaker, Mr. H. S. Van Scoyoc. Subject, "Concrete Road Construction with reference to the Toronto-Hamilton Highway." Held in Society's Rooms at Engineers' Club. Number present, 60.

Friday, June 11th, 1915.—Business Meeting. Object, "The formation of Standing Committees to work in unison with those formed in Montreal on the various branches of the profession." Held in Society's Rooms at Engineers' Club. Number present, 40.

Tuesday, November 22nd, 1915.—Address. Speaker, Mr. J. A. D. McCurdy. Subject, "Aviation and its use in the War." Held in Chemistry and Mining Building, University of Toronto. Number present, 75.

Friday, December 17th, 1915.—Business Meeting. Object, "To bring out discussion on the proposed Amendments to the Society's By-Laws made by the Council and those made by the British Columbia Members, and the presentation of Committee Reports."

Held in the Society's Rooms at Engineers' Club. Number present, 45.

Friday, January 14th, 1916.—Annual Meeting. Held in Society's Rooms, Engineers' Club. Reports of Committees received and discussed. Election of Officers. Number present, 60.

Mr. Weller, Chief Engineer of the Welland Ship Canal kindly invited the Branch to inspect the construction work between Thorold and Port Weller.

On Friday morning, November 5th, the members left Toronto in cars provided through the kindness of Mr. Kelley of the Grand Trunk Railway, and arrived at Thorold before noon.

The party walked over a short section of the work before lunch, which was served in a construction camp.

Under the guidance of Mr. Weller and staff, the party then proceeded the remaining distance in observation cars kindly provided by the Toronto, Niagara and St. Catharines Railway, over Mr. Weller's construction railway, stopping at various points to inspect and receive detailed descriptions and explanations.

This wonderful work is proceeding quietly without the usual clamour that accompanies work of this magnitude, and a trip of this kind convinces one that Canada is not behind in engineering feats.

After leaving Port Weller, the party returned over the Toronto, Niagara and St. Catharines Railway to St. Catharines, where dinner was served.

The trip was thought by all to be most instructive and interesting, and the Branch is indebted to all the officials who aided to make it so successful.

The Rooms of the Branch consisting of a Lecture Room and Reading Room, are in the Engineers' Club of Toronto. An extensive Library is available for use by the members, being the combined libraries of the Toronto Branch of the Canadian Society of Civil Engineers, the Engineers' Club, the Ontario Association of Land Surveyors and the Ontario Society of Architects. A Library Committee of the Toronto Branch has been at work, and numerous additions and improvements have been made. Comfortable Reading Rooms are available and an increasing number of readers are making use of the privileges.

The financial statement for the year shows that the Branch is in fair condition, due to the rigid economy exercised throughout the year.

We regret to report the death of Mr. R. Sherwood Elmsley, A.M.Can.Soc.C.E., and member of the Toronto Branch.

The following Officers were elected unanimously:—

Chairman—Geo. A. McCarthy, Engineer, Railways & Bridges, City.

Secretary-Treasurer—Prof. L. M. Arkley, University of Toronto.

Executive—E. W. Oliver, Assistant Engineer, C.N.R.
A. H. Harkness, Structural Engineer.
A. M. Mudge, Electrical Engineer.
H. G. Acres, Hydraulic Engineer.

C. H. R. FULLER, Secretary-Treasurer.
J. R. W. AMBROSE, Chairman.

Moved by Mr. J. R. W. Ambrose, seconded by Mr. A. F. Macallum, that the report of the Toronto Branch be adopted as presented. Carried.

REPORT OF THE QUEBEC BRANCH.

To the President and Members of the Canadian Society of Civil Engineers:—

The Council of the Quebec Branch of the Canadian Society of Civil Engineers begs to submit the following report for the year 1915:—

MEMBERSHIP.

Members	23
Associate Members	53
Juniors	13
Associates (Branch)	2
Students	19
	110

This is an increase of twelve over last year's membership.

The Annual Meeting of the Quebec Branch was held on the 18th January, 1916. The following officers were elected:—

Chairman—S. S. Oliver.
Secretary-Treasurer—Ivan E. Vallée.
Councillors—T. A. J. Forrester, Gabriel Henry, J. F. Guay.

The Past Chairmen were:—W. D. Baillairgé, A. R. Décary. A. Amos.

Seven meetings of the Branch were held during the year.

During the past year, one candidate, Mr. J. A. Lefebvre, presented himself for examination in Municipal Engineering, and having been found qualified, was admitted as Associate Member.

It is with much regret that we have to note the death of one of our well-known members, Mr. A. Leofred.

Ten of our members have volunteered for overseas service in the present war, namely: Lt.-Col. F. M. Gaudet, R. A. Sterling, Major T. L. Tremblay, Lt.-Col. J. A. Dansereau, E. O. Greening, N. Barclay, R. S. Smith, E. E. Hawkins, Lt. Merrylees and C. C. Lindsay. Of the above, Mr. R. A. Sterling has been reported killed in action, and his death is deeply regretted by the members of this Branch.

The following are the Officers elected by the Branch for the year 1916:—

Chairman—A. E. Doucet.
Secretary-Treasurer—I. E. Vallée.
Councillors—T. A. J. Forrester,
Gabriel Henry,
Altheod Tremblay.

Respectfully submitted,

STUART S. OLIVER, Chairman.
IVAN E. VALLÉE, Secretary-Treasurer.

Moved by Mr. A. Surveyer, seconded by Mr. C. B. Brown, that the report of the Quebec Branch be adopted as presented. Carried.

BRITISH COLUMBIA DIVISION.

PROF. C. H. MCLEOD,
Secretary Canadian Society of Civil Engineers,
176 Mansfield Street, Montreal.

Dear Sir:—

I have pleasure in transmitting herewith a copy of the minutes of the First Meeting of the Committee of the Provincial Division of British Columbia held on October 23rd, 1915, and also of the First General meeting of the British Columbia Division held on the 11th day of December, 1915.

I may say that the By-Laws for the Division have not yet been completed.

Yours very truly,

E. A. CLEVELAND, Secretary-Treasurer.

Minutes of Provincial Committee.

The first meeting of the Provincial Committee of the Provincial Division of British Columbia of the Canadian Society of Civil Engineers met on Saturday, 23rd October, 1915, at 10.30 a.m., in the room of the Vancouver Branch, 1017 Metropolitan Building, Vancouver, B.C.

The following members were present:—A. E. Ashcroft, Vernon, B.C.; A. D. Creer, Vancouver, B.C.; W. K. Gwyer, Yale, B.C.; D. R. Harris, Victoria, B.C.; R. F. Hayward, Vancouver, B.C.

It was moved by Mr. Creer and seconded by Mr. Gwyer, "That Mr. Hayward take the chair for this meeting." Carried.

It was moved by Mr. Hayward and seconded by Mr. Gwyer, "That Mr. Mills act as Secretary for this meeting." Carried.

The Secretary then read a letter from Professor McLeod, dated March 16th, 1915, stating that the By-Law "Re" formation of Provincial Divisions of the Society had been adopted. Also a letter from Professor McLeod, dated July 22nd, 1915, stating that Provincial Division of British Columbia is duly constituted.

The Secretary then read By-Law 56 relating to the formation of Provincial Divisions.

It was moved by Mr. Creer and seconded by Mr. Ashcroft, "That embodied in the By-Laws be that the first Executive Committee of the Provincial Division of British Columbia consist of the following members who were elected by the vote of their respective Branches and outside membership:—Mr. D. R. Harris and Mr. Wm. Young, Victoria; Mr. A. D. Creer and Mr. R. F. Hayward, Vancouver; Mr. E. A. Ashcroft, Vernon, and Mr. W. K. Gwyer, Yale, for Outside Members; Mr. T. H. White and Mr. N. J. Ker, Councillors of Parent Society, ex-officio." Carried.

It was moved by Mr. Harris and seconded by Mr. Gwyer, "That Mr. White be asked to act as first Chairman of the Provincial Division of British Columbia of the Canadian Society of Civil Engineers." Carried.

It was moved by Mr. Creer and seconded by Mr. Harris, "That Mr. Cleveland be asked to act as first Secretary-Treasurer of the Provincial Division of British Columbia of the Canadian Society of Civil Engineers." Carried.

It was moved by Mr. Creer and seconded by Mr. Ashcroft, "That when necessary the business of the Provincial Division be conducted by correspondence." Carried.

After a short discussion, it was moved by Mr. Ashcroft and seconded by Mr. Gwyer, "That Mr. Hayward, Mr. Creer and Mr.

Cleveland be asked to draft a set of By-Laws for the Provincial Division and submit them to the Committee for further discussion." Carried.

It was moved by Mr. Harris and seconded by Mr. Gwyer, "That the first Annual Meeting of the Provincial Division of the Canadian Society of Civil Engineers be held December 10th and 11th, in Vancouver, at the same time as the Convention of the Victoria and Vancouver Branches." Carried.

The Chairman instructed the Secretary to forward a copy of the minutes of this Meeting together with a copy of the By-Laws of the Vancouver Branch to each of the Members of the Committee of the Provincial Division of British Columbia.

The meeting then adjourned.

Minutes of the First General Meeting of the British Columbia Division of the Canadian Society of Civil Engineers, held concurrently with the Fourth Annual Convention of the Victoria and Vancouver Branches of the Society on Saturday, the 11th day of December, 1915, at 10.30 a.m., at the Board of Trade Rooms, in the City of Vancouver.

The following members were present:—F. C. Gamble, President Canadian Society of Civil Engineers, in the Chair; T. H. White, (Councillor), Vancouver; N. J. Ker, (Councillor), Vancouver; Donald Cameron, Vancouver; R. W. Macintyre, Victoria; D. R. Harris, Victoria; Richard Hall, Vancouver; H. K. Dutcher, Vancouver; H. E. R. Hamilton, Vancouver; Fred. L. Macpherson, Vancouver, (Burnaby); C. C. Worsfold, New Westminster; H. E. C. Carry, Vancouver; W. Anderson, Vancouver; E. G. Matheson, Vancouver; C. E. Cartwright, Vancouver; Chas. Garden, Vancouver; R. Fowler, Victoria; A. G. Dalzell, Vancouver; D. O. Lewis, Victoria; A. E. Foreman, Victoria; Wm. Young, Victoria; E. A. Cleveland, Vancouver; H. W. E. Canavan, Victoria; R. F. Hayward, Vancouver; F. O. Mills, Vancouver; Jas. H. Kennedy, Vancouver.

The minutes of the meeting of the last convention of the Branches were read and on motion confirmed.

Mr. Gamble, President of the Society, then addressed the meeting, expressing his pleasure in presiding, and referring to the work done by the Branches, and to the necessity of energetic endeavour on the part of each member to assist in forwarding the interests of the Society throughout the Dominion.

It was then moved by H. W. E. Canavan and seconded by Donald Cameron, "That this Convention of the Victoria and Van-

couver Branches now resolve itself into a general meeting of the British Columbia Division." Carried.

It was moved by E. A. Cleveland and seconded by T. H. White, "That the President, Mr. Gamble, continue in the Chair." Carried.

The Secretary then read the notices convening the meeting and the minutes of the first meeting of the Provincial Committee of the British Columbia Division.

It was moved by A. E. Foreman and seconded by D. R. Harris, "That the minutes of the first meeting of the Committee of the British Columbia Division be confirmed and the actions of the Committee be approved." Carried.

T. H. White, Chairman of the Division, requested that Mr. Gamble continue in the Chair during the meeting, which request was acceded to.

The following resolution was put to the meeting and carried:—

"That the Committee in charge of preparation of By-Laws for the Division submit the same by letter ballot to the members of the Society resident in the Province."

The Chairman called on the Committee appointed to consider the establishment of a standard datum plane for British Columbia for its report. Mr. Dalzell, replying for the Committee, explained that much of the work had been done by correspondence and though considerable progress had been attained some further time would be required to complete the duties laid upon the Committee.

On motion, the Committee was reappointed for the ensuing year.

H. W. E. Canavan reported that a Committee of the Vancouver and Victoria Branches had requested the Provincial Government to amend the "Interpretation Act" R. S. B. C. 1911 by inserting therein the following definition of the word "Engineer," viz.:—"Engineer" where used in the "Water Act," the "Health Act," the "Municipal Act," "Drainage and Dyking Act," and "Local Improvement Act," shall mean a member of the Canadian Society of Civil Engineers, or of the Institutions of Civil Engineers of Great Britain or of Ireland, or of the American Society of Civil Engineers. The request, however, was not granted, and in order that the matter may be further pressed, the Committee was continued for one year.

Wm. Young expressed the opinion that the objects of the Society would be furthered by a campaign to increase our "Associate" class by inviting men prominent in public life and large manufacturing enterprises to join.

The Chairman then referred to the circular letter, dated November 25th, 1915, issued by the Councillors resident in Montreal, and signed by the Secretary of the Parent Society, regarding certain proposed amendments to the By-Laws of the Society, and suggested that a letter from the British Columbia Members should be prepared and forwarded without delay to all Corporate Members of the Canadian Society of Civil Engineers.

It was moved by Mr. Lewis and seconded by Mr. Canavan, "That the Chairman appoint a Committee to draft a letter as suggested. The Chairman thereupon appointed R. F. Hayward, H. W. E. Canavan, D. O. Lewis, E. G. Matheson, to prepare a draft letter to be submitted at the afternoon session." Carried.

The meeting was then adjourned to meet at 3.00 p.m., at the Blue Room of the Hotel Vancouver.

Meeting called to order at 3.00 p.m.

It was moved by William Young and seconded by H. K. Dutcher, "Whereas it is essential that those who are eligible and desirable within the meaning of By-Law number 11 be secured as Associates.

"Therefore be it resolved that the membership bring to the attention of those who are eligible and desirable, the fact that they are eligible as Associates, and that their interest in the Society would be appreciated."

The resolution created an interesting discussion for and against, and was finally carried.

The circular letter to members of the Society as prepared by the Committee was then read and discussed in detail.

It was moved by H. K. Dutcher and seconded by H. W. E. Canavan, "That the circular letter be printed and sent to every Corporate Member without delay." Carried.

It was moved by Mr. Lewis and seconded by Mr. Cartwright, "That the circular letter be signed by the Chairmen and Secretaries of the Victoria and Vancouver Branches, and of the British Columbia Division." Carried.

It was moved by H. W. E. Canavan and seconded by A. E. Foreman, "That a letter of congratulation on his appointment as a member of the Imperial Munitions Board be sent to Mr. G. H. Dawson, A.M.Can.Soc.C.E." Carried.

A vote of thanks to the President for his services as Chairman was moved by H. F. Hayward, seconded by Donald Cameron, and carried.

Mr. T. H. White, as Chairman of the Division, tendered Mr. Gamble the thanks of the meeting, to which the President replied.

The meeting then adjourned to the 10th day of December, 1916.

In the evening a Conversazione was held at the Hotel Vancouver, which was well attended by members and guests, and proved to be an interesting and enjoyable function.

A unique feature was introduced by the exhibition of full sized high explosive shell casings manufactured in Vancouver for the battle front, the process employed being graphically explained by an expert, who, commencing with the rough billet, carried his interested audience, step by step, through to the finished product.

It was moved by Mr. D. O. Lewis, seconded by Mr. J. R. W. Ambrose, that the report of the British Columbia Division be adopted as presented. Carried.

REPORTS OF COMMITTEES.

Cement Specifications.—Mr. E. Brown moved the adoption of the report of the Committee on Portland Cement and the accompanying specification as printed on pages 10, 11 and 12 of the Reports of Committees. Mr. W. J. Francis seconded the motion.

The Secretary presented a letter from Mr. W. G. Chace in discussion of the proposed specification. After this letter had received consideration, the motion was put and unanimously adopted.

The President stated that the specification as recommended by this Committee become a Standard Specification of the Society.

It was then resolved to adjourn the meeting to the following day at 3.00 p.m.

Wednesday Afternoon Session, January 26th, 1916.

Mr. F. C. Gamble, President, in the Chair.

Mr. E. W. Oliver presented the report of the Committee appointed to draft a resolution on Society affairs and proposed the following, seconded by Mr. J. A. Jamieson:—

"That this meeting instruct the Council to appoint a Committee for the purpose of studying and reporting upon a policy for increasing the prestige and influence of the Society and including a consideration of the organization and by-laws and for making such recommendations for amendments, if any, as they see fit. The personnel of the Committee is to be composed of representatives of each district and of the same number as the representation on the

Council, each district to elect its own representatives. The Branches within each district shall nominate for election their representatives, but where no Branch exists the Council shall nominate not less than three candidates for election in that district. The Committee appointed shall have power to select its own Chairman, Vice-Chairman and Secretary and obtain all necessary information from headquarters.

"The Council shall so soon as the Committee has been appointed call for the election of the Chairman of the Committee, and for this purpose shall issue a ballot which shall include all the names of the said Committee.

"The Committee shall report to the Council not later than the first day of September, 1916, and such report shall be distributed by the Council to the members of the Society within thirty days thereafter."

This resolution was adopted.

A letter from Mr. J. G. LeGrand, as to existing conditions in the Dominion and in the Society as affected by the great war, was read by Mr. B. S. McKenzie.

Following a discussion on the issue raised by Mr. LeGrand, it was moved by Mr. H. R. Safford, seconded by Mr. A. F. Macallum, "That a Committee be appointed, consisting of Messrs. Conway, Mountain, Monsarrat and Anderson, and such others as the President may name, to consider and prepare a formal resolution to be sent to the proper military authorities, offering support and co-operation on behalf of the Society along the lines of engineering assistance in the matter of training engineer officers." Carried.

The Secretary read a letter received from the Ottawa Branch giving particulars of the recent activities of that Branch in military engineering.

Continuation of Reports of Committees.

Mr. James White, as Chairman of the Committee on Conservation, presented the report of his Committee as printed. After discussion the report was accepted as a progress report.

It was moved by Mr. A. F. Macallum, seconded by Mr. W. F. Tye, "That all the other reports on the agenda be considered as read." Carried.

Report of Electro-Technical Commission.—Dr. L. A. Herdt.—"The report is printed on pages 12 and 13 of the Reports of Com-

mittees, and I would move that the report of this Committee be received and the Committee be re-appointed."

Seconded by Mr. J. Duchastel. Carried.

Report of Committee on Steel Bridge Specifications.—Mr. P. B. Motley presented a progress report on Steel Bridge Specifications. He suggested a reorganization of the work of the Committee. On motion by Mr. Motley, seconded by Mr. G. A. Mountain, it was resolved that the interim report of the Committee on Steel Bridge Specifications, as printed on page 23 of the Reports of Committees, be received and the Committee be continued. Carried.

The further consideration of Reports of Committees was then adjourned until Thursday morning, and the President delivered his address. On the conclusion of the address Mr. G. A. Mountain moved, seconded by Mr. C. H. Keefer, that Mr. W. F. Tye, Past-President of the Society, take the Chair for a few moments.

Mr. W. F. Tye.—"Gentlemen.—You have listened to this very instructive address with a great deal of pleasure I know, as I have. I would call upon Colonel Anderson to move a vote of thanks."

Col. W. P. Anderson, in moving a vote of thanks, congratulated Mr. Gamble on his very interesting address, and expressed for himself and the members present high appreciation of the manner in which so important a subject—The Development of the Western Coast of Canada—had been treated.

Mr. C. H. Keefer seconded the resolution of thanks, which was adopted with applause.

Mr. Gamble addressed the meeting in the following words:—

"I am very grateful to you for the very kind and flattering remarks you have made. I am sure that it has been a pleasure to come here to meet you and to find so many cordial and genial friends who have shown me a great deal of kindness. I can only hope that if you ever do come as far as the Coast that you will come in large numbers so that we may have the opportunity of tendering to you the hospitality of British Columbia. We looked forward to that visit last year, but we quite understood the reasons of the cancellation of that engagement with us. I thank you very much."

The session then adjourned.

MORNING SESSION, THURSDAY, JANUARY 27TH, 1916.

The President, Mr. F. C. Gamble, in the Chair.

CONTINUATION OF THE RECEPTION OF REPORTS OF COMMITTEES.

Report of Committee on Sewage Disposal and Sanitation.—Moved by Mr. A. Surveyer, seconded by Mr. W. Muir Edwards, that this report be received. Carried.

It was then moved by Mr. Edwards, seconded by Mr. Surveyer, "That in the opinion of this Society it is desirable that a communication be sent to the Provincial Boards of Health by the incoming Council, pointing out that it is inadvisable that any Public Officials before whom plans of Water Works or Sewerage Systems come for approval shall be financially interested in the use of any special form of plant, apparatus or system connected therewith."

The motion, after discussion, was put to the meeting and lost on division.

Report on Educational Requirements.—Mr. E. Marceau presented the report as published and then moved, seconded by Col. W. P. Anderson, that the report of the Committee on Educational Requirements be adopted and the Committee continued. Carried.

Report of the Examination Board.—Moved by Prof. H. M. MacKay, seconded by Mr. A. Surveyer, that the report of the Examination Board be received. Carried.

Report of Committee on Reinforced Concrete.—Moved by Mr. W. J. Francis, seconded by Prof. E. Brown, that the report of the Committee on Reinforced Concrete be received and the Committee continued. Carried.

Report of Committee on General Clauses for Specifications.—After discussion it was moved by Sir John Kennedy, seconded by Mr. C. H. Keefer, that the report of the Committee on General Clauses be accepted as a progress report and the Committee continued. Carried.

It was understood that the Committee should give special attention to the preparation of "draft clauses" applicable to different lines of work, and on the request of Mr. Ambrose, the report of the Toronto Committee on General Clauses for Specifications was to be turned over to the Committee for its information.

Report of Committee on Cast Iron Water Pipes and Specials.— In the absence of the Chairman of the Committee, the Secretary read the report.

On motion by Mr. W. F. Tye, seconded by Sir John Kennedy, the report was received and the Committee discharged.

It was understood that the existing specifications as to cast iron water pipes should be retained as the Standard Specifications of the Society.

The Committee appointed at the Wednesday afternoon session to prepare a resolution to be submitted to the military authorities of the Government, renewing its offer of support and co-operation in the matter of training engineer officers, reported the following resolution:—

The resolution was proposed by Mr. G. R. G. Conway, seconded by Mr. G. A. Mountain, and adopted by unanimous vote of the meeting.

"That the Canadian Society of Civil Engineers assembled at their Annual Meeting, and including representatives from all parts of Canada, realizing that the work of the trained engineer is becoming more and more of vital importance for the successful termination of the present war, desires to place its organization at the disposal of the Dominion Government for the purpose of assisting and co-operating by every means in its power in properly training competent officers for the engineering branches of the service.

"This meeting believes that by the hearty and loyal co-operation of the Society which its members are anxious to give, the Dominion Government would have available for advice and assistance at all times, the organized services of the best and most highly trained engineers in Canada.

"The Society would draw attention to the fact that already about twelve per cent. of its membership has volunteered for the defence of the Empire, but feels that the services of these men have not been used to the best advantage, as many of them have been drafted into other branches of the service than the engineers. The Society would impress upon the Government the importance of requiring that all engineer officers should have had practical engineering training before receiving commissions."

The Secretary was instructed to forward the resolution to the Premier and the Minister of Militia, and after receiving an acknowledgment to give it to the Press.

Reports of Scrutineers.—Messrs. Riddell, Stead, Graham and Hutchison, Auditors, who had been appointed scrutineers of the ballots, presented their reports.

The President declared the result of the vote on Amendments to By-Laws as follows:—462 valid votes were cast. The amendments to By-Laws Nos. 7, 18, 27, 29, 30, 36, 50 and 56 as proposed by the Council of the Society were carried. The amendments to By-Laws Nos. 7, 8, 9, 10, 16, 27, 30, 33 and 56 as proposed by British Columbia members were not adopted.

As a result of the vote for Officers and Members of Council for the next terms, the President declared the following elected:—

As President for 1916, Mr. G. H. Duggan.

As Vice-President for the term of 3 years, Mr. T. H. White.

As Councillors for 3 years, Mr. J. R. W. Ambrose, Mr. H. Donkin, Mr. A .E. Doucet, Mr. W. J. Francis, Mr. E. D. Lafleur, Mr. D. O. Lewis, Mr. D. A. Ross, Mr. H. R. Safford.

Mr. Gamble then requested the newly elected President, Mr. G. H. Duggan, to take the Chair.

Mr. Duggan addressed the meeting as follows:—

"I thank you for this reception. I appreciate most highly the honour you have conferred upon me in electing me to this office, which has been held by some of our most illustrious engineers, and is the highest ambition of every Canadian engineer. It shall be my highest endeavour to uphold the traditions of this Society, as well as those progressive ideas so well voiced at this meeting."

CONTINUATION OF REPORTS OF COMMITTEES.

Report of Committee on Roads and Pavements.—Moved by Mr. A. F. Macallum, Seconded by Mr. J. R. W. Ambrose, that the report of the Committee on Roads and Pavements be received and the Committee continued. Carried.

Election of Members of Nominating Committee.—The President called for nominations to the Committee to make nominations for Officers and Members of Council for the year 1917. The Secretary read the following, which had been submitted:—

For District No. 1 by the Council of the Society—Messrs. Ernest Brown and L. A. Amos.

For District No. 2 by Members of the Council resident in that district—Mr. G. G. Murdoch.

For District No. 3 by the Quebec Branch—Messrs. Altheod Tremblay and A. E. Doucet.

For District No. 4 by the Ottawa Branch—Messrs. G. A. Mountain, C. R. Coutlee and A. B. Lambe.

For District No. 5 by the meeting—Mr. A. F. Macallum.

For District No. 6 by the Manitoba Branch—Messrs. W. L. Mackenzie and J. A. Douglas.

For District No. 6 by the Regina Branch—Messrs. H. S. Carpenter and R. J. Leckie.

For District No. 6 by the Edmonton and Calgary Branches—Mr. J. Chalmers.

For District No. 7 by the Victoria and Vancouver Branches—Mr. E. A. Cleveland.

Mr. J. Duchastel and Mr. H. M. MacKay were appointed scrutineers, and a ballot was taken as a result of which the following were elected to the Committee:—

For District No. 1—E. Brown.
" " " 2—G. G. Murdoch.
" " " 3—A. Tremblay.
" " " 4—G. A. Mountain.
" " " 5—A. F. Macallum.
" " " 6—J. Chalmers.
" " " 7—E. A. Cleveland.

Gzowski Medal.—The Committee presented its report recommending that the Gzowski Medal should be awarded to Messrs. E. Brown, H. M. MacKay and C. M. Morssen for their paper No. 373 on Tests on the Shearing Resistance of Reinforced Concrete Beams. It was moved by Mr. G. A. Mountain and seconded by Mr. A. R. Decary that this report be adopted. Carried.

It was moved by Mr. G. A. Mountain, seconded by Col. W. P. Anderson, that it be recommended to the Committee on the revision of by-laws, etc., to consider the advisability of changing the designation of the Society to that of Canadian Institution of Civil Engineers. Carried.

The following votes of thanks were unanimously adopted:—

To the retiring President and Members of Council on motion by Mr. G. A. Mountain, seconded by Mr. H. D. Lumsden.

To the Montreal Tramways Company on motion by Mr. A. F. Macallum, seconded by Mr. J. R. W. Ambrose.

To the Railways of the Eastern Canadian Passenger Association on motion by Mr. C. H. Keefer, seconded by Mr. Stuart Howard.

To the Railways of the Western Canadian Passenger Association on motion by Mr. W. Muir Edwards, seconded by Mr. F. de C. Davies.

To the Canadian Vickers Company, Limited, on motion by Mr. Wm. McNab, seconded by Mr. J. A. Jamieson.

To the Reception and Entertainment Committees for the Meeting, on motion by Col. Anderson, seconded by Mr. Geoffrey Stead.

The meeting then adjourned.

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